

# POLYCHAETOUS ANNELIDS FROM CALIFORNIA

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## ABSTRACT

The POLYCHAETOUS ANNELIDS of California are named with 650 species in 283 genera, 5 subgenera and 56 families. Twenty-four new species or subspecies, three new genera, two new names and eight new combinations are given. In all 549 species or 84%, are believed to have their known geographic distribution limited to California or the northeastern Pacific Ocean, and about 101 others, of more cosmopolitan character, are known also from other oceans.

## INTRODUCTION

The diversity of the polychaetes of California can be partly expressed in terms of diversity of that state's topographic features. It has a coastline of more than 1300 miles, including nearly 300 miles of offshore islands which are mainly in southern California. This coastline extends chiefly north to south, through nearly 10 degrees of latitude, from 42° north (in the latitude of Massachusetts) to 32.5° north (in the latitude of South Carolina). The largest enclosed embayment is San Francisco Bay, more than 40 miles long; its salinities vary from marine to nearly freshwater. Lesser embayments include Humboldt, Bodega and Tomales Bays north of San Francisco, and Mission and San Diego Bays south of Los Angeles. The main rivers emptying their loads into the sea, and tidal at their mouths for varying distances inland, are the Noyo, Navarro, Eel and Russian Rivers north of San Francisco, the Sacramento River into San Francisco Bay, the Salinas River into Monterey Bay, the Santa Maria River into San Luis Obispo Bay, the Santa Ynez River north of Point Arguello, and numerous smaller rivers in more southern latitudes, which attain important proportions during rainy seasons. The sediments at the mouths of these streams may be expected to support flourishing populations of polychaetes; they are still largely unexplored. In addition there are many outfall lines, draining from the more densely populated parts of central and southern California; they add not only large amounts of water of low salinity, but other materials such as nutrients, terrigenous sediments and toxins of various kinds, all of which may be expected to

affect faunal populations both as to kinds and numbers of species. The preponderance of polychaetes in the shallow shelf areas of southern California has been partly described (Hartman, 1955 to 1959; Emery, 1960, p. 165).

The majority of these geographic areas in California remain unknown for their annelid faunas. Most of the published records of species are based on collections obtained in intertidal areas where universities or their marine laboratories have operated. These areas include Dillon Beach and Tomales Bay north of San Francisco; San Francisco Bay and Moss Beach in the vicinity of Berkeley; Monterey Peninsula in the vicinity of Stanford University, and southern California from Santa Barbara south to the Mexican border, where extensive surveys were conducted by the University of Southern California between 1952 and 1959.

Faunistically considered the most prominent zones are (1) the muddy marshes, bays and estuaries occurring in protected or little disturbed embayments, (2) the long, narrow to broad sandy beaches bordering much of the state of California, constantly buffeted by upsurging currents and tidal movements, and (3) the rocky, irregularly projecting headlands, richly overgrown with plants and attached animals of many kinds. The muddy marshlands of San Francisco and San Pablo Bays have been partly studied by Filice (1945) and Hartman (1954, in which 115 species are named); those of Newport, Mission and San Diego Bays partly by Berkeley and Berkeley (1941) and Hartman (several reports). The intertidal sandy beaches, extending from northernmost to southernmost parts of the state, have a too rigorous climate to support most soft-bodied metazoan animals; the most frequently occurring polychaetes belong to the genera *Eteone*, *Hemipodus*, *Goniada*, *Nephtys* and some opheliids. The rocky shores, extending through intertidal zones from upper, sparsely populated, to low algal overgrown rocks, provide the greatest diversity of habitats and consequently a varied polychaete fauna. Each of these zones is characterized by many kinds of polychaetes. Because these intertidal zones are the most accessible to the collector, they are also the best known.

Subintertidal zones of California are much less known. Some of the earliest studies resulted from cruises of the U.S.S. ALBATROSS, for which the polychaetes were largely described by Moore (1904 to 1923). The more recent quantitative studies off southern California, supported by the Allan Hancock Foundation, the California State Water Pollution Control Board and the National Science Foundation, between 1952 and

1960, resulted in the conclusion that the polychaetes are the most abundant and prominent of invertebrate animals in nearly all of the benthos of southern California, from Point Conception to south of the Mexican border, in depths of 10 to 300 feet, and into canyon and basin depths. In 4000+ measured samples taken throughout this area, the polychaetes were usually the most abundant and the greatest in mass, exceeded in number in some instances only by amphipods and ophiuroid echinoderms, and in mass by an echiuroid worm in one area. The details of these quantitative studies are to be found in separate reports (see Literature Cited), issued by the California State Water Pollution Control Board and the Allan Hancock Foundation.

The most urgent need for a better knowledge and understanding of the polychaetes of California, as in other geographic areas, is an *Atlas of Species*, giving acceptable specific names, keys to related species, diagnoses with critical illustrations for each species, more extended geographic distribution, and ecological data. The present study is intended to provide the framework for such an atlas.

The following list names 56 families and 650 species. About 60 other species, for which tentative determinations have been made, are known to be present in California; they are chiefly representatives of the families HESIONIDAE, POLYNOIDAE, AMPHARETIDAE, TERE-BELLIDAE, SABELLIDAE and SERPULIDAE. The families with their known numbers of species are:

- Aphroditidae—10 species
- Polynoidae—43 species
- Polyodontidae—4 species
- Sigalionidae—11 species
- Pareulepidae—1 species
- Pisionidae—1 species
- Chrysopetalidae—2 species
- Amphinomidae—6 species
- Euphrosinidae—8 species
- Phyllodocidae—35 species
- Alciopidae—4 species
- Lacydoniidae—1 species
- Tomopteridae—4 species
- Hesionidae—6 species
- Pilargidae—7 species
- Syllidae—39 species

Nereidae—28 species  
Nephtyidae—14 species  
Sphaerodoridae—4 species  
Glyceridae—13 species  
Goniadidae—6 species  
Onuphidae—22 species  
Eunicidae—13 species  
Lumbrineridae—22 species  
Arabellidae—11 species  
Lysaretidae—1 species  
Dorvilleidae—4 species  
Myzostomidae—2 species  
Orbiniidae—14 species  
Paraonidae—12 species  
Apistobranchidae—1 species  
Spionidae—45 species  
Magelonidae—4 species  
Disomidae—2 species  
Longosomidae—1 species  
Chaetopteridae—7 species  
Cirratulidae—23 species  
Ctenodrilidae—1 species  
Flabelligeridae—14 species  
Poeobiidae—1 species  
Scalibregmidae—2 species  
Opheliidae—16 species  
Sternaspidae—1 species  
Capitellidae—24 species  
Arenicolidae—4 species  
Maldanidae—27 species  
Oweniidae—4 species  
Sabellariidae—6 species  
Pectinariidae—4 species  
Ampharetidae—22 species  
Terebellidae—38 species  
Trichobranchidae—3 species  
Sabellidae—27 species  
Serpulidae—24 species  
Protodrilidae—1 species  
Dinophilidae—1 species

The 14 best represented families in California are the SPIONIDAE with 45 species, POLYNOIDAE with 43 species, SYLLIDAE with 39 species, TERESELLIDAE with 38 species, PHYLLODOCIDAE with 35 species, NEREIDAE with 28 species, MALDANIDAE with 27 species, SABELLIDAE with 27 species, SERPULIDAE and CAPISELLIDAE with 24 species each, CIRRATULIDAE with 23 species, and ONUPHIDAE, LUMBRINERIDAE and AMPHARETIDAE, with 22 species each.

The bibliographic citations given below, when predating 1959, are in most instances to be found in Hartman (1951a, Bibliography) and Hartman (1959, Catalogue). Some other references are given at the end of this paper.

The following list gives the new specific or generic names and the new combinations:

Family POLYNOIDAE: *Hesperonoë laevis*, n.sp., *Harmothoë priops*, n.sp.; SIGALIONIDAE: *Pholoë glabra*, n.sp.; PHYLLODOCIDAE: *Eumida bifoliata*, n. comb; HESIONIDAE: *Amphiduros pacificus*, n.sp.; *Orseis lagunae*, n.sp.; *Oxydromus arenicolus glabrus*, n.subsp.; and *Oxydromus brunnea*, n.sp.; SYLLIDAE: *Exogone uniformis*, n.sp.; *Exogonella brunnea*, n. gen., n.sp.; *Plakosyllis americana*, n.sp.; EUNICIDAE: *Marphysa disjuncta*, n.sp.; PARAONIDAE: *Paronopsis platybranchia*, n.sp.; SPIONIDAE: *Boccardia basilaria*, n.sp.; *Nerine foliosa occidentalis*, n. subsp.; *Nerinides maculata*, n.sp.; *Nerinides pigmentata*, n.comb.; *Polydora neocardalia*, n.sp.; *Prionospio pygmaeus*, n.sp.; *Spio punctata*, n.sp.; MAGELONIDAE: *Magelona sacculata*, n.sp.; CIRRATULIDAE: *Caulleriella hamata*, n.comb.; *Chaetozone multioculata*, n.sp.; *Raricirrus maculata*, n.gen., n.sp.; FLABELLIGERIDAE: *Flabelligera essenbergae*, n.name; *Pherusa neopapillata*, n.sp.; *Piromis americana*, n. comb.; *Piromis capensis*, n. comb.; *Piromis roberti*, n. comb.; *Piromis gracilis*, n. sp.; AMPHARETIDAE: *Ampharete labrops*, n.sp.; TERESELLIDAE: *Lanassa gracilis*, n. comb.; SABELLIDAE: *Distylidia rugosa*, n. gen. and n. comb., and *Distylidia monroii*, new name.

The polychaetous annelids named in Part I comprise a list of species reported from California. Part II describes species, based largely on collections in the University of Southern California and coming mainly from Point Conception south to the Mexican border. All specimens newly described or reported are deposited in the collections of the Allan Hancock Foundation at Los Angeles.

## ACKNOWLEDGEMENTS

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## PART I

## ANNOTATED LIST OF SPECIES FROM CALIFORNIA

## Family Aphroditidae

- Aphrodita armifera* Moore, 1910. Includes *A. raripillata* Essenberg, 1917. See Hartman, 1939, p. 20. Fairly common on shallow silty bottoms from Monterey and southern California, in 5 to 55 fms.
- Aphrodita brevitentaculata* Essenberg, 1917. See Berkeley and Berkeley, 1941, p. 20. Southern California, in kelp holdfasts.
- Aphrodita castanea* Moore, 1910. Includes *A. californica* Essenberg, 1917. See Hartman, 1936a, p. 32. Southern California and western Mexico; littoral.
- Aphrodita japonica* Marenzeller, 1879. Includes *A. cryptommata* Essenberg, 1917, and *A. leioseta* Chamberlin, 1919. See Berkeley and Berkeley, 1948, p. 7. Both sides of the north Pacific Ocean, south to southern California; littoral, in silt and sandy sediments.
- Aphrodita longipalpa* Essenberg, 1917. See Berkeley and Berkeley, 1948, p. 6. Southern California and western Canada, in deep water.
- Aphrodita negligens* Moore, 1905. See Berkeley and Berkeley, 1948, p. 8. Northeastern Pacific Ocean, in dredgings.

- Aphrodita parva* Moore, 1905. See Berkeley and Berkeley, 1948, p. 7. Northeastern Pacific Ocean south to western Mexico, in shallow depths to 667 fms; on silty bottoms.
- Aphrodita refulgida* Moore, 1910. See Hartman, 1939, p. 23. Monterey and southern California; in shallow silty bottoms.
- Laetmonice pellucida* Moore, 1903. See Moore, 1910, p. 386. Northeast Pacific Ocean, in deep to abyssal depths; silts.
- Laetmonice producta wyvillei* McIntosh, 1885. See Moore, 1910, p. 386. North and south Pacific oceans; abyssal to 3120 fms.

### Family Polynoidae

- Admetella renotubulata* (Moore) 1910. Off southern California, in abyssal depths.
- Antinoella anoculata* (Moore) 1910. See Hartman, 1960a, p. 80. Southern California and western Mexico, in deep water to 766 fms.
- Antinoella macrolepida* (Moore) 1905. See Berkeley and Berkeley, 1948, p. 14, as *Antinoe macrolepida*, and Hartman, 1960a, p. 80. Alaska to southern California, in considerable depths, perhaps rocky areas.
- Antinoella* sp., Hartman, 1960a, p. 79. Southern California, in long shore basins; silt.
- Arctonoë fragilis* (Baird) 1863. See Berkeley and Berkeley, 1948, p. 20. Alaska to Lower California, in depths to 150 fms; commensal with seastars and gastropods.
- Arctonoë pulchra* (Johnson) 1897. See Berkeley and Berkeley, 1948, p. 21. Alaska to Lower California, littoral; commensal with *Cryptochiton*, *Luidia*, *Solaster*, *Megathura*, *Stichopus*; and free living.
- Arctonoë vittata* (Grube) 1855. See Berkeley and Berkeley, 1948, p. 20. Alaska to Ecuador; commensal with *Diadora*, and other mollusks; seastars; and free living.
- Eunoë barbata* Moore, 1910. See Berkeley and Berkeley, 1948, p. 14. Alaska to California, in deep water; commensal with holothurians.
- Eunoë senta* (Moore) 1902. See Hartman, 1939, p. 52, and Berkeley and Berkeley, 1948, p. 13. Alaska to southern California, in deep water, on rocky bottoms.
- Evarnella forcipata* (Marenzeller) 1902. See Moore, 1910, p. 358. Southern Japan and California, in depths to 580 fms; rocky habitats.

- Evarnella fragilis* (Moore) 1910. Southern California, in depths to 600 fms; perhaps on rocks. It approaches *Evarnella impar* (Johnston) from northern Europe.
- Halosydna brevisetosa* Kinberg, 1855. See Hartman, 1939, p. 34, and Berkeley and Berkeley, 1948, p. 18. Alaska to central California, rare in southern California; intertidal in *Mytilus* zone; free-living or in tubes of terebellids and *Platynereis bicanaliculata*.
- Halosydna johnsoni* (Darboux) 1899. See Hartman, 1939, p. 34. Southern California and western Mexico; intertidal; in *Mytilus* zone, or commensal with terebellids.
- Halosydna lator* Chamberlin, 1919. See Hartman, 1938b, p. 110. Southern California and western Mexico; perhaps commensal.
- Halosydna tuberculifer* Chamberlin, 1919. Southern California at Laguna Beach; intertidal under stones.
- Harmothoë crassicirrata* Johnson, 1897. Monterey and southern California, to 100 fms; in rocky habitats.
- Harmothoë hirsuta* Johnson, 1897. See Hartman, 1939, p. 51. Alaska to southern California; intertidal to shallow rocky depths.
- Harmothoë imbricata* (Linnaeus) 1767. See Berkeley and Berkeley, 1948, p. 11. Northern California northward to Alaska, rare off southern California; cosmopolitan; usually intertidal.
- Harmothoë lunulata* (delle Chiaje) 1841. See below. See Hartman, 1944c, p. 244. Southern California to western Canada; southern Europe; very common in shallow depths in silty bottoms; probably commensal.
- Harmothoë priops*, new species. See below.
- Harmothoë scriptoria* Moore, 1910. See below. Nearly related to *Harmothoë lunulata*, differing only in details of neuropodial setae. Southern California, in 50 fms or deeper; on silty bottoms.
- Harmothoë tenebricosa* Moore, 1910. Southern California and western Mexico, abyssal depths, silt.
- Hesperonoë adventor* (Skogsberg) 1928. See below, in Key. California north to Alaska; intertidal; commensal with echiuroid, *Urechis caupo* Fisher.
- Hesperonoë complanata* (Johnson) 1901. See Berkeley and Berkeley, 1948, p. 10. Western Canada to southern California; intertidal; commensal with ghost shrimp, *Callinassa californiensis* Dana.
- Hesperonoë laevis*, new species. See below.
- Intoshella caeca* (Moore) 1910. See Hartman, 1938b, p. 121; Hartman, 1959b, p. 67 (as *Eunoë caeca*). Southern California, in deep water; probably commensal with a holothurian.

- Lagisca extenuata* (Grube) 1840. Includes *Harmothoë triannulata* Moore, 1910. See Berkeley and Berkeley, 1948, p. 12 (as *Harmothoë triannulata*). Alaska to southern California; in deep or abyssal depths.
- Lagisca lamellifera* (Marenzeller) 1879. See Moore, 1910, p. 341. Alaska to Lower California, Mexico; in deep or abyssal depths.
- Lagisca multisetosa* Moore, 1902. See Berkeley and Berkeley, 1948, p. 15. Alaska to western Mexico, in great depths.
- Lagisca pedroensis* Hartman, 1960a, p. 80. San Pedro basin, southern California, in subsill depths.
- Lagisca yokohamiensis* McIntosh, 1885. See Moore, 1910, p. 343. Japan, northern Pacific Ocean south to southern California.
- Lepidasthenia gigas* (Johnson) 1897. See Hartman, 1939, p. 47. Southern California; intertidal; commensal with terebellids.
- Lepidasthenia interrupta* (Marenzeller) 1902. See Moore, 1910, p. 331. Both sides of north Pacific Ocean, to 369 fms; commensal with maldanid, *Maldanella robusta*.
- Lepidasthenia longicirrata* Berkeley, 1923. See Berkeley and Berkeley, 1948, p. 19. Northeast Pacific Ocean, in shallow silty bottoms; commensal with maldanid, *Praxillella affinis pacifica*.
- Lepidonotus caelorus* Moore, 1903. See Berkeley and Berkeley, 1948, p. 9. Both sides of north Pacific Ocean, in shallow to abyssal depths; usually on rocky bottoms. Intergrades with the cosmopolitan *Lepidonotus squamatus* (Linnaeus).
- Lepidonotus leius* Chamberlin, 1919. Laguna Beach, southern California; dredged; rare.
- Lepidonotus setosior* Chamberlin, 1919. Laguna Beach, southern California; rare.
- Macellicephala ?aciculata* (Moore) 1910. Southern California, in deep water; silty bottom.
- Macellicephala remigata* (Moore) 1910. See Hartman, 1938b, p. 122. Southern California, in depths to 600 fms; rocky bottom.
- Malmgrenia nigralba* Berkeley, 1923. See Berkeley and Berkeley, 1948, p. 10. Western Canada to southern California; commensal with a holothuroid, *Leptosynapta* sp.
- Nemidia microlepidia* Moore, 1910. Central and southern California, in 39 to 149 fms; rocky bottoms.
- ?*Polynoë filamentosa* Moore, 1910. Southern California, in deep water to 600 fms; probably rocky bottom.
- Thormora johnstoni* (Kinberg) 1855. See Hartman, 1939, p. 50. Southern California to Ecuador; on rocky bottoms.

## Family Polyodontidae

- Panthalis mortenseni* (Monro) 1928. See Hartman, 1939, p. 87. Pacific Panama to southern California, in San Pedro channel in 27-44 fms; in compact sandy silt.
- Panthalis pacifica* Treadwell, 1914. See Hartman, 1939, p. 87. Southern California, in shelf and slope depths; silty bottoms.
- Peisidice aspera* Johnson, 1897. See Berkeley and Berkeley, 1948, p. 24. Northeastern Pacific Ocean south to San Diego, California; intertidal to slope depths; in rocky habitats.
- Polyodontes panamensis* (Chamberlin) 1919. See Hartman, 1939, p. 84. Pacific Panama to southern California; in silty bottoms.

## Family Sigalionidae

- Leanira alba* Moore, 1910. See Hartman, 1960a, p. 82. Southern California, near San Diego, in depths of about 650 fms.
- Leanira areolata* McIntosh, 1885. See Moore, 1910, p. 391. Japan and California to western Mexico, in depths to 971 fms.
- Leanira calcis* Hartman, 1960a, p. 82. San Nicolas basin, southern California, in 866 fms.
- Leanira fimbriarum* Hartman, 1939. Southern California to western Mexico, shallow bottoms to 60 fms.
- Pholoë glabra*, new species. See below.
- Psammolyce spinosa* Hartman, 1939. Southern California and western Mexico, in about 46 fms, sands.
- Sthenelais fusca* Johnson, 1897. See Hartman, 1939, p. 61. Washington south to southern California; intertidal and in shallow dredgings, especially among eel grass roots.
- Sthenelais tertagliabra* Moore, 1910. See Berkeley and Berkeley, 1948, p. 23, as *Sthenelais articulata*. Western Canada to southern California; common in mixed sediments of shelf and slope depths.
- Sthenelais verruculosa* Johnson, 1897. See Hartman, 1939, p. 62. Western Canada to western Mexico, in shallow bottoms to 50 fms.
- Sthenelanella uniformis* Moore, 1910. See below. Hartman, 1939, p. 69. Southern California to Ecuador, in shelf to slope depths, in mixed sediments. *Sthenelanella atypica* Berkeley and Berkeley, 1941, from southern California, is perhaps the same. See below.
- Thalenessa spinosa* (Hartman) 1939. Southern California, in shelf depths, common in muddy to mixed sediments.

## Family Pareulepididae

*Pareulepis fimbriata* (Treadwell) 1901. See below.

## Family Pisionidae

*Pisione* nr *remota* (Southern) 1914. See below.

## Family Chrysopetalidae

*Chrysopetalum occidentale* Johnson, 1897. See below.

*Paleanotus bellis* (Johnson) 1897. See below.

## Family Amphinomidae

*Chloeia entypa* Chamberlin, 1919. See Hartman, 1940, p. 205. Western Mexico; rare off southern California, in shallow depths.

*Chloeia pinnata* Moore, 1911. See Plate 3. See Hartman, 1940, p. 206. Southern California; very common in depths to 310 fms, on sandy to silty bottoms.

*Eurythoë complanata* (Pallas) 1766. See Hartman, 1951b, p. 25. Both sides of tropical America; rare off southern California.

*Pareurythoë californica* (Johnson) 1897. See Hartman, 1940, p. 203. Southern to central California; common under intertidal stones.

*Pareurythoë spirocirrata* (Essenberg) 1917. Probably San Diego, California; rare. Perhaps the same as *Pareurythoë californica* (Johnson).

*Pseudeurythoë* cf. *ambigua* (Monro) 1933. See Hartman, 1960a, p. 83. Pacific Panama in 6-12 fms, and West Cortes basin, California, in subsill depths.

## Family Euphrosinidae

*Euphrosine arctica* Johnson, 1897. See Berkeley and Berkeley, 1948, p. 29. California to Alaska, to 100 fms; rocky habitat.

*Euphrosine aurantiaca* Johnson, 1897. See Hartman, 1940, p. 210. Southern California to western Mexico, in holdfasts in shallow water.

*Euphrosine bicirrata* Moore, 1905. See Berkeley and Berkeley, 1948, p. 28. Alaska south and seldom to southern California, dredged.

- Euphrosine calypta* Essenberg, 1917. Off Santa Barbara, California, dredged.
- Euphrosine dumosa* Moore, 1911. Central and southern California, dredged in 61 to 195 fms.
- Euphrosine hortensis* Moore, 1905. See Berkeley and Berkeley, 1948, p. 29. Alaska to California, dredged.
- Euphrosine limbata* Moore, 1911. Southern California, off San Nicolas Island, in 33 fms, sand.
- Euphrosine paucibranchiata* Hartman, 1960a, p. 84. Santa Cruz basin, southern California, in silty sediments.

### Family Phyllodocidae

- Anaitides groenlandica* (Oersted) 1843. See Berkeley and Berkeley, 1948, p. 46. Circumboreal, south to northern California.
- Anaitides heterocirrus* Chamberlin, 1919. Southern California. It may be a juvenile of *Anaitides medipapillata* (Moore).
- Anaitides longipes* (Kinberg) 1866. See Hartman, 1936b, p. 117. Chile and central California, rare, intertidal.
- Anaitides madeirensis* (Langerhans) 1880. See Berkeley and Berkeley, 1948, p. 45. Southern California in shallow depths; cosmopolitan.
- Anaitides medipapillata* (Moore) 1909. See Hartman, 1936b, p. 119. Southern California and western Mexico, in rocky intertidal habitats. This may intergrade with *Anaitides madeirensis* (Langerhans).
- Anaitides mucosa* (Oersted) 1843. See Berkeley and Berkeley, 1948, p. 46. Western Canada to southern California, in shallow silty sediments; cosmopolitan.
- Anaitides* nr. *multiseriata* Rioja, 1941. See Hartman, 1959b, p. 143.
- Anaitides williamsi* Hartman, 1936. Central and southern California, intertidal, in silty sands.
- Clavadoce splendida* Hartman, 1936. Tomales Bay, California, in intertidal mud flats.
- Eteone* nr. *alba* Webster, 1879. New Jersey and southern California, in sandy beaches in shallow depths.
- Eteone balboensis* Hartman, 1936. Balboa Bay, California, in sandy mud beach.
- Eteone californica* Hartman, 1936. Central and southern California, in silty sands of shallow depths.
- Eteone dilatata* Hartman, 1936. Central and southern California, in silty sands of shallow depths.

- Eteone lighti* Hartman, 1936. San Francisco Bay, California; in sandy silt.
- Eteone pacifica* Hartman, 1936. Western Canada to central California, in shallow bottoms.
- Eulalia aviculiseta* Hartman, 1936. Central California; intertidal in rocky habitats.
- Eulalia levicornuta* Moore, 1909. Southern California and western Canada, dredged.
- Eulalia quadrioculata* Moore, 1906. Washington to California.
- Eulalia viridis* (Linnaeus) 1767. See below.
- Eumida bifoliata* (Moore) 1909, new combination. See below.
- Eumida longicornuta* (Moore) 1906. Washington to California, dredged in rocky bottoms.
- Eumida sanguinea* (Oersted) 1843. See Berkeley and Berkeley, 1948, p. 47. Western Canada south to southern California, cosmopolitan; in shallow bottoms with mixed sediments.
- Eumida tubiformis* Moore, 1909. Southern California, in depths to 339 fms.
- Genetyllis castanea* (Marenzeller) 1879. See Berkeley and Berkeley, 1948, p. 44. California; both sides of the North Pacific Ocean, in littoral depths, rocky habitats.
- Genetyllis nigrimaculata* (Moore) 1909. See Berkeley and Berkeley, 1948, p. 49, as *Eulalia*. Western Canada to California, in depths to 71 fms.
- Hesperophyllum tectum* Chamberlin, 1919. Southern California. This species was said to be related to *Notophyllum* sp.; it remains incompletely known and the type specimen is lost.
- Hypoeulalia bilineata* (Johnson) 1840. See Berkeley and Berkeley, 1948, p. 48, as *Eulalia*. Northeastern Pacific Ocean, in shallow bottoms; western Europe.
- Notophyllum imbricatum* Moore, 1906. See Berkeley and Berkeley, 1948, p. 42. Alaska south to northern California, in shallow bottoms.
- Paranaitis polynoides* (Moore) 1909. See Berkeley and Berkeley, 1948, p. 44. Western Canada to southern California, in depths to 100 fms; seldom in southern California.
- Phyllodoce ferruginea* Moore, 1909. Southern California, in mixed sediments.
- Phyllodoce* sp. See below.
- Sige californiensis* Chamberlin, 1919. Laguna Beach, California, intertidal under stones. This species approaches *S. macroceros* (Grube) from the Mediterranean Sea.

*Sige montereyensis* Hartman, 1936. Central California, in shallow rocky bottoms.

*Steggoa californiensis* Hartman, 1936. Central California, in intertidal rocky areas.

*Steggoa gracilior* Chamberlin, 1919. Southern California, intertidal.

### Family Alciopidae

*Alciopina tenuis* (Apstein) 1900. See Dales, 1957, p. 125, as *Plotohelmis*. Pelagic, off California.

*Naiades cantrainii* delle Chiaje, 1830. See Dales, 1957, p. 113. Pelagic, off California.

*Rhynchonereella angelini* (Kinberg) 1866. See Dales, 1957, p. 133. Pelagic, off California.

*Torrea candida* (delle Chiaje) 1841. See Dales, 1957, p. 111. Pelagic, off California.

### Family Lacydoniidae

*Paralacydonia paradoxa* Fauvel, 1913. See Hartman, 1960a, p. 86. Outer deep basins of southern California, in silts; Mediterranean Sea; western Pacific Ocean.

### Family Tomopteridae

*Tomopteris elegans* Chun, 1888. See Dales, 1957, p. 142. Pelagic, off California.

*Tomopteris nisseni* Rosa, 1908. See Dales, 1957, p. 141. Pelagic, off California.

*Tomopteris pacifica* Izuka, 1914. See Dales, 1957, p. 141. Pelagic, off California.

*Tomopteris septentrionalis* Steenstrup, 1849. See Dales, 1957, p. 145. Pelagic, off California.

### Family Hesionidae

*Amphiduros pacificus*, new species. See below.

*Hesionella mccullochae* Hartman, 1939. Southern California, intertidal, in burrows of *Lumbrineris zonata* (Johnson).

*Ophiodromus pugettensis* (Johnson) 1901. See below.

*Orseis lagunae*, new species. See below.

*Oxydromus arenicolus glabrus*, new subspecies. See below.

*Oxydromus brunnea*, new species. See below.

### Family Pilargidae

*Ancistrosyllis bassi* Hartman, 1945. Southern Florida and San Francisco Bay, southern California, in shallow water sandy silts.

*Ancistrosyllis rigida* Fauvel, 1919. See Hartman, 1947, p. 498. Southern and Lower California; Red Sea; Indian Ocean; West Indies; in shallow water sands.

*Ancistrosyllis tentaculata* Treadwell, 1941. See Hartman, 1947, p. 498. New York and southern California; in silty sediments of shelf and slope depths.

*Loandalia fauveli* Berkeley and Berkeley, 1941. See Hartman, 1947, p. 506. Southern California, in littoral silts.

*Pilargis berkeleyi* Monro, 1933. See Hartman, 1947, p. 491, and Berkeley and Berkeley, 1948, p. 57. Western Washington to southern California; in sandy mud flats.

*Pilargis hamatus* Hartman, 1960a, p. 88. Southern California, in deep basins, in silty sediments.

*Pilargis maculata* Hartman, 1947. Central and southern California; in littoral sandy sediments.

### Family Syllidae

*Amblyosyllis* sp. See Hartman, 1944c, p. 250 (as *Pterosyllis*), and Berkeley and Berkeley, 1948, p. 81. As *A. lineatus* var. *alba*. Central California.

*Autolytus ?cornutus* Agassiz, 1862. See below.

*Autolytus varius* Treadwell, 1914. See below.

*Autolytus*, other species. See below.

*Calamyzas ?amphictenicola* Arwidsson, 1932. See below.

*Campesyllis minor* Chamberlin, 1919. Laguna Beach, California, intertidal in sabellid colony.

*Eusyllis assimilis* Marenzeller, 1875. See Berkeley and Berkeley, 1938, p. 42, and Berkeley and Berkeley, 1948, p. 84. Western Canada south to western Mexico; cosmopolitan.

*Exogone gemmifera* Pagenstecher, 1862. See Berkeley and Berkeley, 1948, p. 79. Northeastern Pacific Ocean and European seas; in shallow sea bottoms.

*Exogone lourei* Berkeley and Berkeley, 1938. See below, in Key.

- Exogone uniformis*, new species. See below.
- Exogone verugera* (Claparède) 1868. See below, in Key.
- Exogonella brunnea*, new genus and species. See below.
- Haplosyllis spongicola* (Grube) 1855, var. See Hartman, 1944c, p. 249.  
Central and southern California; littoral, in sponges.
- Hesperalia nans* Chamberlin, 1919. See below, under *Autolytus* spp.
- Langerhansia heterochaeta* (Moore) 1909. See Berkeley and Berkeley, 1948, p. 76, as *Syllis* (*Ehlersia*). Western Canada to southern California; common on shelf to slope depths, in mixed sediments.
- Odontosyllis parva* Berkeley, 1923. See Berkeley and Berkeley, 1948, p. 83. Western Canada to central California.
- Odontosyllis phosphorea* Moore, 1909. See below.
- Odontosyllis* spp. See below.
- Pionosyllis gigantea* Moore, 1908. See Berkeley and Berkeley, 1948, p. 83. Western Canada to California.
- Pionosyllis typica* Moore, 1909. Santa Cruz Island, California, dredged; rare.
- Plakosyllis americana*, new species. See below.
- Sphaerosyllis hystrix* Claparède, 1863. See Berkeley and Berkeley, 1948, p. 80. Western Canada to southern California; Europe; in shallow bottoms to intertidal.
- Syllis elongata* (Johnson) 1901. See Berkeley and Berkeley, 1948, p. 75. and Rioja, 1941, p. 688. Washington to California; western Mexico.
- Syllis fasciata* Malmgren, 1867. See Berkeley and Berkeley, 1948, p. 74. Central and southern California, north to western Canada; Europe; cosmopolitan; in littoral algal tufts, common.
- Syllis gracilis* Grube, 1840. See Fauvel, 1923, p. 259. Southern California and western Mexico, intertidal.
- Trypanosyllis adamanteus* Treadwell, 1914. See Hartman, 1944c, p. 249. Central California; in rocky intertidal areas.
- Trypanosyllis gemmipara* Johnson, 1901. See Hartman, 1944c, p. 249. Washington to southern California; in rocky habitats.
- Trypanosyllis ingens* Johnson, 1902. See Berkeley and Berkeley, 1952b, p. 488. Central California to western Canada.
- Trypanosyllis intermedia* Moore, 1909. Central and southern California, dredged.
- Typosyllis aciculata* Treadwell, 1945. See Reish, 1950, p. 1. Central California; in rocky habitats.

- Typosyllis alternata* (Moore) 1908. See Berkeley and Berkeley, 1958, p. 77. Western Canada to western Mexico; dredged in shallow depths.
- Typosyllis* nr *armillaris* (Müller) 1771. See below.
- Typosyllis bella* Chamberlin, 1919. Laguna Beach, California, intertidal.
- Typosyllis hyalina* (Grube) 1863. See Fauvel, 1923, p. 262, and Berkeley and Berkeley, 1948, p. 74. Western Canada to southern California; cosmopolitan; littoral.
- Typosyllis lucida* (Chamberlin) 1919. Southern California, littoral.
- Typosyllis pigmentata* (Chamberlin) 1919. Southern California, littoral.
- Typosyllis pulchra* (Berkeley and Berkeley) 1938. See Berkeley and Berkeley, 1949, p. 73. Western Canada south to California; littoral.
- Typosyllis variegata* (Grube) 1860. See Fauvel, 1923, p. 262, and Rioja, 1941, p. 694. Southern California; Europe; cosmopolitan, in littoral depths.

### Family Nereidae

- Ceratocephala crosslandi americana* Hartman, 1952. Southern California; in moderate depths, in stiff clays.
- Ceratocephala loveni pacifica* Hartman, 1960a, p. 94. Southern California; in deep outer basins.
- Ceratonereis mirabilis* Kinberg, 1866. Southernmost parts of California and Brazil; tropical seas; associated with littoral algae.
- Ceratonereis paucidentata* (Moore) 1903. See Berkeley and Berkeley, 1948, p. 63. Alaska south to southern California; chiefly boreal; in silts and mixed sediments.
- Ceratonereis tunicatae* Hartman, 1936. Tomales Bay, California; associated with compound tunicate.
- Cheilonereis cyclurus* (Harrington) 1897. See Berkeley and Berkeley, 1948, p. 61. Northeastern Pacific Ocean; chiefly boreal; commensal in snail shells with pagurid crustaceans.
- Eunereis caeca* Hartman, 1960a, p. 93. In outer basins of southern California.
- Eunereis longipes* Hartman, 1936. Central California; rocky shores.
- Namanereis quadraticeps* (Blanchard) 1849. See Hartman, 1959a, p. 162. Southern California, in very high sandy beaches, associated with small isopods.

- Neanthes brandti* (Malmgren) 1866. Northeast Pacific Ocean, southern California; littoral in sands.
- Neanthes caudata* (delle Chiaje) 1828. See Reish, 1957, p. 216. Los Angeles harbor, southern California.
- Neanthes diversicolor* (Müller) 1776. See Hartman, 1960b, p. 36. Northern and central California; in brackish streams; euryhaline.
- Neanthes succinea* (Frey and Leuckart) 1847. See Hartman, 1945, p. 17. Both shores of United States, central and southern California; Salton Sea; euryhaline, in sandy or silty sediments.
- Neanthes virens* (Sars) 1835. See Berkeley and Berkeley, 1948, p. 62. Western Canada to central California, usually boreal, intertidal, in silts.
- Nereis anoculis* Hartman, 1960a, p. 91. Southern California, in Tanner basin.
- Nereis eakini* Hartman, 1936. See Hartman, 1944c, p. 252, and Berkeley and Berkeley, 1948, p. 63. Central California, intertidal; in rocky habitats.
- Nereis latescens* Chamberlin, 1919. See Hartman, 1944c, p. 253. Central and southern California; intertidal or in very shallow depths; associated with hydroids.
- Nereis mediator* Chamberlin, 1918. See Hartman, 1940, p. 227, and Berkeley and Berkeley, 1948, p. 64, as *Nereis callaona*. Southern California, south to western Mexico; Northeastern Pacific Ocean; in roots of intertidal grasses and algae.
- Nereis mendocinana* Chamberlin, 1919. Mendocino, California; known only through its first account.
- Nereis natans* Hartman, 1936. See Berkeley and Berkeley, 1945, p. 326. Moss Beach, California; western Canada.
- Nereis pelagica neonigripes* Hartman, 1936. See Hartman, 1944c, p. 253. Northern and southern California; intertidal in rocky habitats.
- Nereis procera* Ehlers, 1868. See Berkeley and Berkeley, 1948, p. 66. Western Canada to southern California; in littoral depths; in sandy and silty bottoms.
- Nereis vexillosa* Grube, 1951. See Johnson, M. W., 1943 (Life history), and Berkeley and Berkeley, 1948, p. 65. Both sides of north Pacific; western Canada to central California; common in mussel beds and in pile fauna.
- Nicon moniloceras* (Hartman) 1940. Southern California; associated with brachiopods.

- Perinereis monterea* (Chamberlin) 1918. See Hartman, 1940, p. 229. Washington to western Mexico; intertidal, rocky shores.
- Platynereis bicanaliculata* (Baird) 1863. See Hartman, 1954b, p. 36. North and south Pacific oceans; associated with kelp beds.
- Platynereis dumerilii* (Audouin and Milne Edwards) 1833. Circum-tropical, rare off southern California; intertidal.
- Platynereis polyscalma* Chamberlin, 1919. See Hartman, 1940, p. 229. Western Mexico and southernmost part of southern California.

### Family Nephtyidae

- Aglaophamus dicirris* Hartman, 1950. Southern California, shore to 72 fms; in mixed sediments.
- Aglaophamus erectans* Hartman, 1950. Southern California and western Mexico; in silt.
- Nephtys assignis* Hartman, 1950. Southern California and western Mexico; in sand and silt.
- Nephtys caeca* (Fabricius) 1780. See Berkeley and Berkeley, 1948, p. 54. Circumboreal, to central California; intertidal.
- Nephtys caecoides* Hartman, 1938. See Berkeley and Berkeley, 1948, p. 53. Western Canada to southern California and western Mexico; common in sandy silts.
- Nephtys californiensis* Hartman, 1938. See Berkeley and Berkeley, 1948, p. 53. Central and southern California; in intertidal sands.
- Nephtys ferruginea* Hartman, 1940. See Berkeley and Berkeley, 1948, p. 51. Western Canada to southern California and western Mexico; in depths to 230 fms; common in silty and mixed sediments.
- Nephtys cornuta franciscana* Clark and Jones, 1955. San Francisco Bay, California.
- Nephtys glabra* Hartman, 1950. Southern California, in shallow depths; in mixed sediments.
- Nephtys magellanica* Augener, 1912. Western South American and southern California; shelf depths to 75 fms; in silt.
- Nephtys parva* Clark and Jones, 1955. San Francisco Bay, California.
- Nephtys punctata* Hartman, 1938. See Berkeley and Berkeley, 1948, p. 52. Alaska to southern California, in silty sands; chiefly boreal.
- Nephtys rickettsi* Hartman, 1938. See Hartman, 1950, p. 97. Alaska to southern California; chiefly boreal; to 53 fms.
- Nephtys schmitti* Hartman, 1938. Alaska to central California; in depths to 559 fms.

## Family Sphaerodoridae

*Sphaerodorum brevicapitis* Moore, 1909. Southern California, from great depths.

*Sphaerodorum minutum* (Webster and Benedict) 1887. See below.

*Sphaerodorum papillifer* Moore, 1909. See below.

*Sphaerodorum sphaerulifer* Moore, 1909. Central and southern California, in silty and clayey sediments in shallow depths.

## Family Glyceridae

*Glycera americana* Leidy, 1855. See Hartman, 1950, p. 73. Both shores of North America; in littoral sandy or mixed sediments.

*Glycera capitata* Oersted, 1843. See Berkeley and Berkeley, 1948, p. 38, and Hartman, 1950, p. 76. Central and southern California and both sides of the north Pacific Ocean, also cosmopolitan; in shallow to slope depths, in silty and mixed sediments.

*Glycera capitata branchiopoda* Moore, 1911. See Hartman, 1960a, p. 97. Southern California, in basin depths, in silty muds.

*Glycera convoluta* Keferstein, 1862. See Berkeley and Berkeley, 1948, p. 39, and Hartman, 1950, p. 72. Southern California to western Canada; southern Europe; in sands in shallow depths.

*Glycera dibranchiata* Ehlers, 1868. See Hartman, 1950, p. 70. Eastern United States and southern California, estuarine and in shallow bays.

*Glycera gigantea* Quatrefages, 1865. See Berkeley and Berkeley, 1941, p. 34. Southern California, perhaps intertidal; Europe.

*Glycera oxycephala* Ehlers, 1887. See Hartman, 1950, p. 70. Southern California north to Oregon, in red to brown sands.

*Glycera robusta* Ehlers, 1868. See Berkeley and Berkeley, 1948, p. 39, and Hartman, 1950, p. 69. Northeastern Pacific Ocean, chiefly central and northern California; in mixed sediments at shelf depths.

*Glycera rouxii* Audouin and Milne Edwards, 1833. A single record, Hartman, 1940, p. 245, from off the Farallon Islands, may be referable to *Glycera americana*.

*Glycera tenuis* Hartman, 1944. See Hartman, 1950, p. 71. Southern California to Oregon; in shallow depths; sandy silts.

- Glycera tessellata* Grube, 1863. See Berkeley and Berkeley, 1948, p. 38, and Hartman, 1950, p. 77. Western Canada to southern California; slope to basin depths; southern Europe and cosmopolitan areas.
- Hemipodus borealis* Johnson, 1901. See Berkeley and Berkeley, 1948, p. 36, and Hartman, 1950, p. 81. Alaska and Washington to southern California, and western Mexico, common in intertidal sands and shallow shelf sands.
- Hemipodus californiensis* Hartman, 1938. See Hartman, 1950, p. 81. Southern California; in intertidal sands.

### Family Goniadidae

- Glycinde armigera* Moore, 1911. See Hartman, 1950, p. 49. Western Canada to southern California; common in shallow depths; sandy silts.
- Glycinde polygnatha* Hartman, 1950. Central California and northward, shore to 68 fms.
- Goniada acicula* Hartman, 1940. Southern California and southward.
- Goniada brunnea* Treadwell, 1906. See Hartman, 1950, p. 17. Central and southern California; very common at shelf depths, in mixed sediments.
- Goniada japonica* Izuka, 1912. Japan and southern California, in shallow depths, red sand.
- Goniada littorea* Hartman, 1950. Southern California; in sands of intertidal and shallow littoral depths.

### Family Onuphidae

- Diopatra ornata* Moore, 1911. See Plate 9. See Hartman, 1944a, p. 55; Berkeley and Berkeley, 1948, p. 94. Southern and central California north to western Canada, in shallow depths with algae.
- Diopatra splendidissima* Kinberg, 1865. See Hartman, 1944a, p. 56. Western Mexico; rare off southern California.
- Diopatra tridentata* Hartman, 1944. See Plate 9. Southern California and southward; in shallow depths, in silty sediments.
- Hyalinoecia juvenalis* Moore, 1911. See Hartman, 1944a, p. 46. Southern California; both sides of subtropical America; in shallow depths, silt.
- Hyalinoecia tubicola stricta* Moore, 1911. See Hartman, 1960a, p. 98. Southern California, in basin depths, to 1059 fms.

- Nothria conchylega* (Sars) 1835. See Hartman, 1944a, p. 85; Berkeley and Berkeley, 1948, p. 91. Western and southern Europe, southern California, rare, in slope depths, in mixed sediments.
- Nothria elegans* (Johnson) 1901. See Hartman, 1944a, p. 88; Berkeley and Berkeley, 1948, p. 93. Washington to southern California; common in shelf depths, flourishes in the vicinity of outfalls.
- Nothria geophiliformis* (Moore) 1903. See Hartman, 1944a, p. 83; Berkeley and Berkeley, 1948, p. 91. Alaska to southern California; commonly in red sands in shallow depths at its southern range.
- Nothria hiatidentata* Moore, 1911. See Hartman, 1960a, p. 100. Off southern California, in basin depths.
- Nothria iridescent* (Johnson) 1901. See Hartman, 1944a, p. 87; Berkeley and Berkeley, 1948, p. 93. Western Canada to southern California; usually in slope depths and in mixed sediments. Intergrades with *Nothria elegans* (Johnson).
- Nothria pallida* Moore, 1911. See Plate 9. See Hartman, 1960a, p. 100. Southern California in considerable depths to 638 fms, in silts.
- Nothria stigmatis* (Treadwell) 1922. See Hartman, 1944a, p. 89. Washington to southern California, in littoral depths; in mixed sediments.
- Nothria stigmatis intermedia* Hartman, 1944. San Clemente Island, southern California; in about 20 fms.
- Nothria stigmatis paradiopatra* Hartman, 1944. Central California; intertidal.
- Onuphis eremita* Audouin and Milne Edwards, 1833. See Hartman, 1944a, p. 75. Western and southern Europe; southern California, in red and brown sands of shallow depths.
- Onuphis eremita parva* Berkeley and Berkeley, 1941. Southern California; dredged in 12-17 fms. The varietal name is preoccupied by *Onuphis parva* Moore, 1911.
- Onuphis litoralis* Monro, 1933. See Hartman, 1944a, p. 72. Central California to 83 fms; Galapagos Islands.
- Onuphis microcephala* Hartman, 1944. Southern California and western Mexico; North Carolina; littoral to 13 fms.
- Onuphis nebulosa* Moore, 1911. See Hartman, 1944a, p. 75. Southern California; in sandy silts and mixed sediments; flourishes near outfalls.
- Onuphis parva* Moore, 1911. See Hartman, 1944a, p. 70. Southern California and western Mexico; in shelf depths to 184 fms; in silts.

*Onuphis vexillaria* Moore, 1911. See Hartman, 1944a, p. 80. Southern California and western Mexico; in slope depths to basin levels; in coarse sediments.

*Rhamphobrachium longisetosum* Berkeley and Berkeley, 1938. See Hartman, 1944a, p. 48. Southern California and western Mexico; in depths to 400 fms; in coarse sands.

### Family Eunicidae

*Eunice americana* Hartman, 1944. Southern California and western Mexico, in depths to 175 fms; in silts.

*Eunice antennata* (Savigny) 1820. See Hartman, 1944a, p. 115. Circumtropical, rarely to southern California; in rocky habitats.

*Eunice aphroditois* (Pallas) 1788. See Hartman, 1944a, p. 109. Tropical seas; rare off southern California.

*Eunice longicirrata* Webster, 1884. See Hartman, 1944a, p. 104, and Berkeley and Berkeley, 1948, p. 89, as *E. biannulata*. Tropical America, northward to central California, and western Canada; intertidal, in rocky habitats.

*Eunice multipectinata* Moore, 1911. See Hartman, 1944a, p. 112. Central and southern California; in depths to 150 fms, in silts and mixed sediments.

*Eunice valens* (Chamberlin) 1919. Central California, rare. Perhaps the same as *Eunice tridentata* Ehlers, 1905, from New Zealand.

*Eunice vittata* (delle Chiaje) 1828. See Hartman, 1944a, p. 118. Tropical, rare to southern California.

*Marphysa conferta* Moore, 1811. See below.

*Marphysa disjuncta*, new species. See below.

*Marphysa mortenseni* Monro, 1928. See below.

*Marphysa sanguinea* (Montagu) 1815. See below.

*Marphysa stylobranchiata* Moore, 1909. See below.

*Palola paloloides* (Moore) 1909. See Hartman, 1944a, p. 131. Southern California, in shaley crevices; in shallow depths to 33 fms.

### Family Lumbrineridae

*Lumbrineris acuta* Verrill, 1875. See Hartman, 1944a, p. 145. New England; southern California, in shallow depths, red sands.

*Lumbrineris bassi* Hartman, 1944. Southern Florida and southern California, in shallow depths in silty sediments.

- Lumbrineris bicirrata* Treadwell, 1929. See Hartman, 1944a, p. 156. Washington to southern California, in depths to 200 fms in sandy silts.
- Lumbrineris bifilaris* (Ehlers) 1901. See Hartman, 1944a, p. 153. Chile to southern California, rare.
- Lumbrineris californiensis* Hartman, 1944. Southern California, in shallow depths to 225 fms, silts. This species may be referable to *Lumbrineris ligulata* Berkeley and Berkeley, see below.
- Lumbrineris cruzensis* Hartman, 1944. Southern California, in shallow depths to 103 fms in silty sediments.
- Lumbrineris erecta* (Moore) 1904. See Hartman, 1944a, p. 149. Southern California, intertidal, in rocky and sandy crevices.
- Lumbrineris index* Moore, 1911. See Hartman, 1944a, p. 162. Central and southern California, to 704 fms in sandy silts. Parasitized by gregarines in southern localities.
- Lumbrineris inflata* Moore, 1911. See Hartman, 1944a, p. 160. Southern California to western Canada; western South America; silts.
- Lumbrineris japonica* (Marenzeller) 1879. See Hartman, 1944a, p. 159. North Pacific Ocean, in rocky habitats.
- Lumbrineris latreilli* Audouin and Milne Edwards, 1834. See Hartman, 1944a, p. 158. Southern California, littoral, rocky habitat; cosmopolitan.
- Lumbrineris ligulata* Berkeley and Berkeley, 1941. Southern California, in shallow depths.
- Lumbrineris limicola* Hartman, 1944. See Hartman, 1960a, p. 103. Southern California, in littoral depths, silt.
- Lumbrineris longensis* Hartman, 1960a, p. 103. Long Basin, southern California, in subsill depth.
- Lumbrineris minima* Hartman, 1944. Southern California, in embayments and inshore silts.
- Lumbrineris moorei* Hartman, 1942. See Hartman, 1960a, p. 103. Southern California, in abyssal depths.
- Lumbrineris pallida* Hartman, 1944. Southern California, in shelf and slope depths, silt.
- Lumbrineris sarsi* (Kinberg) 1865. Southern California, rare; Ecuador; probably rocky habitat.
- Lumbrineris* cf. *tetraura* (Schmarda) 1861. See Hartman, 1944a, p. 147. Chile, southern California, littoral.
- Lumbrineris zonata* (Johnson) 1901. See Hartman, 1944a, p. 146. Northeastern Pacific to southern California; intertidal.

*Ninoë fusca* Moore, 1911. See Hartman, 1960a, p. 105. Off southern California, in abyssal depths.

*Ninoë gemmea* Moore, 1911. See Hartman, 1944a, p. 169; Berkeley and Berkeley, 1948, p. 95. Central and southern California; north to western Canada; in shelf and slope depths to 160 fms, in mixed sediments.

### Family Arabellidae

*Arabella iricolor* (Montagu) 1804. See Hartman, 1944a, p. 173; Berkeley and Berkeley, 1948, p. 97. Central and southern California north to western Canada; cosmopolitan; intertidal in rocky habitats.

*Arabella mimetica* Chamberlin, 1919. See Hartman, 1944a, p. 172. Laguna Beach, California, in kelp holdfasts; rare.

*Arabella semimaculata* (Moore) 1911. See Hartman, 1944a, p. 173. Central and southern California; in shallow depths, common in silty sediments.

*Biborin ecbola* Chamberlin, 1911. See Hartman, 1944a, p. 171. Laguna Beach, California, among *Phyllospadix*; rare.

*Drilonereis falcata* Moore, 1911. See Hartman, 1944a, p. 179. Central and southern California, in depths to 167 fms.

*Drilonereis filum* (Claparède) 1868. See Hartman, 1944a, p. 180. Southern California, occasional in littoral depths; Mediterranean Sea and cosmopolitan areas.

*Drilonereis longa* Webster, 1879. See Hartman, 1945, p. 51. Both sides of United States; southern California; intertidal to shallow depths, silt.

*Drilonereis nuda* Moore, 1909. See Hartman, 1944a, p. 178. Central and southern California, in shallow depths; fairly common.

*Labidognathus forcipes* Hartman, 1944. Southern California and western Mexico; endoparasitic in body cavity of *Eunice* spp.

*Notocirrus attenuatus* (Treadwell) 1906. See Hartman, 1944a, p. 176. Monterey Bay, California; rare.

*Notocirrus californiensis* Hartman, 1944. Southern California; free living or in body cavity of *Diopatra ornata* Moore.

### Family Lysaretidae

*Iphitime loxorhynchi* Hartman, 1952. Southern California, in branchial cavity of *Loxorhynchus* (crab).

## Family Dorvilleidae

- Dorvillea articulata* (Hartman) 1938. See Hartman, 1944a, p. 189. Central and southern California, littoral to 50 fms.
- Dorvillea gracilis* (Hartman) 1938. See Hartman, 1944a, p. 189. Central and southern California, littoral in very shallow sands.
- Dorvillea moniloceras* (Moore) 1909. See Hartman, 1944a, p. 190, and Berkeley and Berkeley, 1948, p. 88. Central and southern California, associated with red coralline algae.
- Ophryotrocha puerilis* Claparède and Metschnikow, 1869. See Hartman, 1944a, p. 191. Southern California, intertidal; cosmopolitan in warm seas.

## Family Myzostomidae

- Myzostomum deani* McClendon, 1906. Pacific Grove, California.
- Myzostomum fisheri* Wheeler, 1905. Southern California, in coelomic cavity of a starfish.

## Family Orbiniidae

- Califia calida* Hartman, 1957. Southern California, in slope and basin depths, silt.
- Haploscoloplos elongatus* (Johnson) 1901. See Hartman, 1957, p. 273. Northeastern Pacific Ocean south to western Mexico; very common in intertidal to slope depths, silts and mixed sediments.
- Haploscoloplos panamensis* Monro, 1933. See Hartman, 1957, p. 277. Alaska south to Pacific Panama, in shallow depths.
- Naineris dendritica* (Kinberg) 1867. See Hartman, 1957, p. 299. Northeastern Pacific, south to southern California; littoral, in eel grass roots and mixed sediments.
- Naineris nannobranchia* Chamberlin, 1919. See Hartman, 1957, p. 303. Mendocino, California; rare.
- Naineris* cf. *quadricuspida* (Fabricius) 1780. See below.
- Naineris uncinata* Hartman, 1957. See Hartman, 1960a, p. 107. Alaska to southern California, not common; sandy or eel grass bottoms; in depths to 440 fms.
- Orbinia johnsoni* (Moore) 1909. See Hartman, 1957, p. 257. Central and southern California, in sandy silt, especially in protected bays.

- Phylo felix* Kinberg, 1866. See Hartman, 1957, p. 262. Both sides of America; southern California; in shallow sands to 55 fms.
- Phylo nudus* (Moore) 1911. See Hartman, 1957, p. 268; Hartman, 1960a, p. 108. Southern California, in 200 to 500 fms, mixed sediments.
- Phylo ornatus* (Verrill) 1873. See Hartman, 1957, p. 265. Southern California and western Mexico; southeastern United States; intertidal, in mudflats.
- Scoloplos acmeiceps* Chamberlin, 1919. See Hartman, 1957, p. 282. Southern California north to Alaska; in shallow depths, associated with kelp holdfasts.
- Scoloplos acmeiceps profundus* Hartman, 1960a, p. 108. Southern California, in deep outer basins.
- Scoloplos armiger* (Müller) 1776. See Hartman, 1957, p. 280. Southern California in shallow sands; southern Europe.

#### Family Paraonidae

- Aricidea (Aedicira) pacifica* Hartman, 1944. See Hartman, 1957, p. 326. Newport Bay, California, intertidal in eel grass flats.
- Aricidea (Aedicira) ramosa* Annenkova, 1934. See Hartman, 1957, p. 327. Soviet Arctic Ocean and deep basins of southern California.
- Aricidea (Aricidea) lopezi* Berkeley and Berkeley, 1956. See Hartman, 1960a, p. 111.
- Aricidea (Aricidea) nr suecica* Eliason, 1920. See Hartman, 1957, p. 319. Southern California, common in littoral silty bottoms.
- Aricidea (Aricidea) uschakowi* Zachs, 1925. See Berkeley and Berkeley, 1952a, p. 38, as *A. longicornuta*. North Pacific Ocean south to southern California, in slope and basin depths at the southern end of its range.
- Aricidea (Cirrophorus) aciculata* Hartman, 1957. Southern California, in littoral depths to 177 fms, silty brown sand.
- Aricidea (Cirrophorus) furcata* Hartman, 1957. Southern California, in shallow depths, red sands.
- Paraonis gracilis* (Tauber) 1879. See Hartman, 1957, p. 330. Southern California, common on shelf to basin depths, silt.
- Paraonis gracilis oculata* Hartman, 1957. Southern California, in shelf depths, silt.
- Paraonis multibranchiata* Hartman, 1957. Santa Barbara Channel, California, in 305 fms, silt.

- Paraonis (Paraonides) lyra* Southern, 1914. See Hartman, 1957, p. 334. Southern California; rare; western Europe.
- Paraonis platybranchia*, new species. See below.

### Family Apistobranchidae

- Skardaria ?fragmentata* Wesenberg-Lund, 1951. See below.

### Family Spionidae

- Boccardia basilaria*, new species. See below.
- Boccardia proboscidea* Hartman, 1940. See Berkeley and Berkeley, 1952a, p. 17. Central and southern California north to western Canada; intertidal, in tidal pools and shaley rocky crevices.
- Boccardia redeki* (Horst) 1920. See Hartman, 1941, p. 304. Southern California; western Europe; littoral.
- Boccardia truncata* Hartman, 1936. San Mateo County, California, from sandstone reefs.
- Boccardia uncata* Berkeley, 1927. See Plate 15. See Berkeley and Berkeley, 1952a, p. 14. Western Canada to southern California, in shallow depths, in oyster beds.
- Dispio uncinata* Hartman, 1951. See below.
- Laonice cirrata* (Sars) 1851. See Berkeley and Berkeley, 1952a, p. 26. Western Canada to southern California; western and southern Europe; in shallow depths, silt.
- Laonice foliata* (Moore) 1923. See Hartman, 1960a, p. 114.
- Laonice sacculata* (Moore) 1923. See Hartman, 1960a, p. 113.
- Morants duplex* Chamberlin, 1919. Balboa, southern California, rare.
- Nerine cirratulus* (delle Chiaje) 1828. See Berkeley and Berkeley, 1952a, p. 27. Western Canada to southern California; Mediterranean Sea.
- Nerine foliosa* (Audouin and Milne Edwards) 1833, *occidentalis*, new subspecies. See below.
- Nerinides acuta* (Treadwell) 1914. See Hartman, 1941, p. 294. Southern California, in intertidal sands.
- Nerinides maculata*, new species. See below.
- Nerinides pigmentata* (Reish) 1959, new combination. See below.
- Polydora armata* Langerhans, 1880. See Rioja, 1943, p. 230; Hartman, 1941, p. 307. Northeastern Pacific Ocean, cosmopolitan, in coralline algae.

*Polydora brachycephala* Hartman, 1936. See Hartman, 1941, p. 307. Central and southern California, in intertidal and shallow littoral silts.

*Polydora citrona* Hartman, 1941. Mission Bay, California, in low intertidal silts.

*Polydora commensalis* Andrews, 1891. See Berkeley and Berkeley, 1952a, p. 18; Hartman, 1941, p. 307. Both sides of North America, from western Canada south to western Mexico; commensal with hermit crabs.

*Polydora giardi* Mesnil, 1896. See Hartman, 1944c, p. 259; Hartman, 1941, p. 307. Alaska to western Mexico; western Europe.

*Polydora ligni* Webster, 1879. See Berkeley and Berkeley, 1952a, p. 19; Hartman, 1941, p. 307. Western Canada south to western Mexico; cosmopolitan; fouling on bottoms of ships.

*Polydora limicola* Annenkova, 1934. See below.

*Polydora neocardalia*, new species. See below.

*Polydora nuchalis* Woodwick, 1953. Southern California, estuarine, in slough near Playa del Rey.

*Polydora quadrilobata* Jacobi, 1883. See below.

*Polydora socialis* (Schmarda) 1861. See Hartman, 1941, p. 310. Chile, central and southern California.

*Polydora tricuspa* Hartman, 1939. See Rioja, 1939, p. 304. Hartman, 1941, p. 307. Galapagos Islands, western Mexico, rare off southern California.

*Polydora websteri* Hartman, 1943. See below.

*Prionospio cirrifera* Wirén, 1883. See Berkeley and Berkeley, 1952a, p. 28; Hartman, 1960a, p. 115. Bering Sea to southern California.

*Prionospio heterobranchia newportensis* (Reish) 1959, p. 58. Newport Bay, California.

*Prionospio malmgreni* Claparède, 1870. See Berkeley and Berkeley, 1952a, p. 29. Western Canada to southern California; cosmopolitan.

*Prionospio pinnata* Ehlers, 1901. See Hartman, 1960a, p. 114; Berkeley and Berkeley, 1952a, p. 30. Chile, north to western Canada, eurybathic, in silty sediments.

*Prionospio pygmaeus*, new species. See below.

*Pseudopolydora* sp. See below.

*Pygospio californica* Hartman, 1936. See Hartman, 1944c, p. 260. Central California, intertidal.

*Rhynchospio arenincola* Hartman, 1936. Central and southern California, littoral.

- Scolecopsis* sp. Mission Bay, California, intertidal. Berkeley and Berkeley, 1941, p. 42, as *Scolecopsis indica*.
- Spio filicornis* (Müller) 1766. See Hartman, 1941, p. 293. Central California, in intertidal beaches.
- Spio punctata*, new species. See below.
- Spiophanes anoculata* Hartman, 1960a, p. 118. Southern California, in deep basins, mud.
- Spiophanes bombyx* (Claparède) 1870. See Berkeley and Berkeley, 1952a, p. 22. Western Canada to southern California; Mediterranean Sea; in silty sediments.
- Spiophanes fimbriata* Moore, 1923. See Hartman, 1960a, p. 117. Southern California, slope and basin depths, in silt.
- Spiophanes missionensis* Hartman, 1941. Southern California, intertidal and shelf depths, in silt.
- Spiophanes pallidus* Hartman, 1960a, p. 118. Southern California, in basin depths, silt.
- Streblospio benedicti* Webster, 1879. See Hartman, 1944c, p. 260. Both sides of United States, central and southern California, intertidal.

#### Family Magelonidae

- Magelona californica* Hartman, 1944. Southern California, intertidal.
- Magelona pacifica* Monro, 1933. See Hartman, 1944c, p. 320. Southern California, Pacific side of Panama.
- Magelona pitelkai* Hartman, 1944. See Berkeley and Berkeley, 1952a, p. 13. Central and southern California north to western Canada; in shallow and intertidal depths, silt.
- Magelona sacculata*, new species. See below.

#### Family Disomidae

- Disoma franciscanum* Hartman, 1947. San Francisco Bay and southern California north of Channel Islands, silt. Greatest concentrations were noted at Velero IV stations 5261 (6), 5262 (27), 5413 (1).
- Poecilochaetus johnsoni* Hartman, 1939. Southern California, in low intertidal and shelf depths, sandy silt.

#### Family Longosomidae

- Longosoma catalinensis* Hartman, 1944. See Hartman, 1957, p. 336. Southern California, off Oceanside, in shallow sands.

## Family Chaetopteridae

*Chaetopterus variopedatus* (Renier) 1804. See Plate 19. See Fauvel, 1927, p. 77. Southern California, flares some distance from Whites Point outfall, common in scattered areas off Santa Catalina and Santa Cruz islands.

*Mesochaetopterus alipes* Monro, 1928. Pacific Panama to southern California, rare.

*Mesochaetopterus rickettsii* Berkeley and Berkeley, 1941. Newport Bay, southern California, in silty sands.

*Mesochaetopterus taylora* Potts, 1914. See Berkeley and Berkeley, 1952a, p. 61. Western Canada to California; littoral.

*Phyllochaetopterus limicolus* Hartman, 1960a, p. 120. Shelf, slope and basin depths of southern California; in silt.

*Phyllochaetopterus prolifica* Potts, 1914. See Plate 19. See Berkeley and Berkeley, 1952a, p. 63. Washington to southern California, in shallow rocky habitats.

*Telepsavus costarum* Claparède, 1870. See Plate 19. See Berkeley and Berkeley, 1952a, p. 63. Western Canada to southern California, cosmopolitan.

## Family Cirratulidae

*Acrocirrus crassifilis* Moore, 1923. Southern California, in slope depths to 281 fms, in rocky habitats.

*Caulleriella alata* (Southern) 1914. See below.

*Caulleriella hamata* (Hartman) 1948. New comb. See below.

*Chaetozone corona* Berkeley and Berkeley, 1941. See below.

*Chaetozone gracilis* (Moore) 1923. See below.

*Chaetozone multioculata*, new species. See below.

*Chaetozone setosa* Malmgren, 1867. See below.

*Chaetozone spinosa* Moore, 1903. See below, in Key.

*Cirratulus cirratus* (Müller) 1776. See below.

*Cirratulus cirratus cingulatus* Johnson, 1901. See below.

*Cirratulus cirratus spectabilis* (Kinberg) 1866. See below.

*Cirriformia luxuriosa* (Moore) 1904. See below, in Key.

*Cirriformia spirabrancha* (Moore) 1904. See below, in Key.

*Gossura candida* Hartman, 1955. See below, in Key. Southern California, in shelf and low intertidal depths, in silty sediments.

- Cossura pygodactylata* Jones, 1956. See below, in Key. San Francisco Bay and north of Channel Islands, southern California, in shelf depths, in silty sediments.
- Dodecaceria concharum* Oersted, 1843. See below, in Key. See Berkeley and Berkeley, 1952a, p. 34. Western Europe; western Canada to southern California, penetrating calcareous structures in littoral zones.
- Dodecaceria fewkesi* Berkeley and Berkeley, 1954. See Plate 20. Northeastern Pacific Ocean, in intertidal, rocky habitats.
- Raricirrus maculata*, new genus, new species. See below.
- Tharyx monilaris* Hartman, 1960a, p. 127. See below. Southern California, in shelf to basin sediments, silt.
- Tharyx multifilis* Moore, 1909. See below. See Berkeley and Berkeley, 1952a, p. 34. Southern California, intertidal to shelf depths.
- Tharyx parvus* Berkeley, 1929. See below. See Berkeley and Berkeley, 1952a, p. 35, as *T. multifilis parvus*. Northeastern Pacific, intertidal, silts.
- Tharyx tessellata* Hartman, 1960a, p. 126. See below. Southern California, in shelf to basin depths, silt.
- Timarete perbranchiata* (Chamberlin) 1918. Pacific Grove and southern California; in rocky habitats.

#### Family Ctenodrilidae

- Ctenodrilus serratus* (Schmidt) 1857. See Hartman, 1944c, p. 323; Berkeley and Berkeley, 1952a, p. 37. Central and southern California, contaminant in aquaria, cosmopolitan.

#### Family Flabelligeridae

- Brada glabra* Hartman, 1960a, p. 129. Southern California, in slope and basin depths, silt.
- Brada pilosa* Moore, 1906. Alaska south to southern California.
- Brada pluribranchiata* (Moore) 1923. Southern California, in sandy silts.
- Flabelligera commensalis* Moore, 1909. See below.
- Flabelligera cssenbergae*, new name. See below.
- Flabelligera infundibularis* Johnson, 1901. See Berkeley and Berkeley, 1952a, p. 7. Western Canada and Alaska south to southern California.

- Ilyphagus ilyvestis* Hartman, 1960a, p. 130. Long Basin, southern California.
- Pherusa capulata* (Moore) 1909. See Plate 31. Southern California, common in mixed sediments in shelf depths.
- Pherusa collarifera* (Ehlers) 1887. Off Florida in considerable depths; southern California to 488 fms.
- Pherusa inflata* (Treadwell) 1914. Central and southern California, in shallow depths, in shaley rocks.
- Pherusa papillata* (Johnson) 1901. See below.
- Pherusa neopapillata*, new species. See below.
- Piromis americana* (Monro) 1928, new combination. See below.
- Piromis gracilis*, new species. See below.

#### Family Poeobiidae

- Poeobius meseres* Heath, 1930. See Hartman, 1955b, p. 52. Pelagic, off northern California.

#### Family Scalibregmidae

- Oncoscolex pacificus* (Moore) 1909. See Berkeley and Berkeley, 1952a, p. 59. Central and southern California, in moderate depths.
- Scalibregma inflatum* Rathke, 1843. See Berkeley and Berkeley, 1952a, p. 58. Northeastern Pacific to southern California; cosmopolitan.

#### Family Opheliidae

- Ammotrypane aulogaster* Rathke, 1843. See Berkeley and Berkeley, 1952a, p. 92. Northeastern Pacific Ocean to western Mexico, in moderate depths; cosmopolitan.
- Ammotrypane pallida* Hartman, 1960a, p. 133. Southern California, in outer basins.
- Armandia bioculata* Hartman, 1938. See Hartman, 1944c, p. 267. Central and southern California, intertidal to shallow shelf depths.
- Euzonus dillonensis* (Hartman) 1938. See Hartman, 1950b, p. 431. Central California, in intertidal sandy beaches.
- Euzonus (Thoracophelia) mucronata* (Treadwell) 1914. See Berkeley and Berkeley, 1952a, p. 93. Central and southern California, in sandy beaches.
- Euzonus (Thoracophelia) williamsi* (Hartman) 1938. See Hartman, 1944c, p. 267. Central California, in sandy beaches.
- Ophelia assimilis* Tebble, 1953. California and Oregon.

- Ophelia limacina* (Rathke) 1843. See Berkeley and Berkeley, 1941, p. 47. Northeastern Pacific Ocean, cosmopolitan, in low intertidal and shallow sandy beaches.
- Ophelia magna* (Treadwell) 1914. See Hartman, 1938c, p. 107. Southern California, in sandy bottoms.
- Ophelia pulchella* Tebble, 1953. Southern California.
- Polyophtalmus pictus* (Dujardin) 1839. See Berkeley and Berkeley, 1941, p. 48. Western Canada to southern California, in algal associations on rocky coasts.
- Polyophtalmus translucens* Hartman, 1960a, p. 135. Southern California in Long Basin and off Patton escarpment, at great depths.
- Travisia brevis* Moore, 1923. See Berkeley and Berkeley, 1952a, p. 90. Western Canada to southern California, silts. (This species measures to 17 mm long, consists of 23-24 segments and has 2 narrow preanal, asetigerous segments.)
- Travisia gigas* Hartman, 1938. Central and southern California. This species measures 50-100 mm long, consists of about 46 setigerous segments; posterior segments have conspicuous parapodial lappets.
- Travisia granulata* Moore, 1923. Central and southern California, in coarse sand and rocks, in depths to 57 fms. This species measures 30 to 52 mm long, consists of 32 to 50 segments and the last 5 segments lack setae. The surface pustules are large, crowded and cover the entire surface.
- Travisia pupa* Moore, 1906. See Berkeley and Berkeley, 1952a, p. 89. Alaska south to southern California. This species measures 24 to 85 mm long, consists of 31 to 32 segments or as low as 24 segments. The surface pustules tend to be limited to the posterior part of a segment.

#### Family Sternaspidae

- Sternaspis fossor* Stimpson, 1854. See Moore, 1923, p. 218, and Berkeley and Berkeley, 1952a, p. 59. Western Canada to southern California; cosmopolitan.

#### Family Capitellidae

- Anotomastus gordiodes* (Moore) 1909. See Hartman, 1947, p. 442. Southern California, in shelf depths, silt.
- Capitella capitata* (Fabricius) 1780. See below.
- Capitella capitata ovincola* Hartman, 1947. See below, discussion following Key.

- Capitella* spp. See below, in Key.
- Capitellides* sp. See below, in Key.
- Capitita ambiseta* Hartman, 1947. Southern California, in intertidal silts.
- Capitomastus* sp. See below, in Key.
- Dasybranchus glabrus* Moore, 1909. See Hartman, 1947, p. 434. Southern California and western Mexico.
- Dasybranchus lumbricoides* Grube, 1878. See Hartman, 1947, p. 431. California, cosmopolitan.
- Heteromastus filiformis* (Claparède) 1864. See Hartman, 1947, p. 427. Central and southern California; European seas.
- Heteromastus flobranchus* Berkeley and Berkeley, 1932. See Berkeley and Berkeley, 1952a, p. 103. Western Canada to southern California; peak concentrations in *Listriolobus pelodes* (echiuroid) beds, off Santa Barbara shelf and in Hueneme canyon.
- Leiocapitella glabra* Hartman, 1947. Western Mexico; southern California.
- Leiochrides hemipodus* Hartman, 1960a, p. 136. Southern California, in deep basins, silt.
- Leiochrides pallidior* (Chamberlin) 1918. See Hartman, 1947, p. 429. Central California.
- Mediomastus californiensis* Hartman, 1944. See Hartman, 1947, p. 408. Oregon to southern California, very common in shallow silty bottoms.
- Mediomastus glabrus* Hartman, 1960a, p. 138. Santa Catalina, San Nicolas and Tanner basins, southern California.
- Neoheteromastus lineus* Hartman, 1960a, p. 137. San Nicolas and Santa Catalina basins, southern California.
- Notomastus (Clistomastus) hemipodus* Hartman, 1947. North Carolina, southern California, in shallow bottoms.
- Notomastus (Clistomastus) lineatus* Claparède, 1870. See Hartman, 1947, p. 419. Western Canada to southern California; European seas.
- Notomastus (Clistomastus) tenuis* Moore, 1909. See Hartman, 1947, p. 420. California to western Canada.
- Notomastus lobatus* Hartman, 1947. Southern California and western Mexico, in shelf depths.
- Notomastus magnus* Hartman, 1947. Central and southern California, in slope to basin depths.
- Notomastus precocis* Hartman, 1960a, p. 139. Southern California, in basin depths, silt.

*Scyphoproctus oculatus* Reish, 1959, p. 78. Southern California from Point Conception to the Mexican border, in shallow depths, sandy silts.

### Family Arenicolidae

*Abarenicola pacifica* Healy and Wells, 1959, p. 330. Alaska to northern California. (Pacific records previously called *Arenicola clapedii* Levinsen.)

*Abarenicola vagabunda oceanica* Healy and Wells, 1959, p. 330. Northern California through Alaska.

*Arenicola cristata* Stimpson, 1856. See Berkeley and Berkeley, 1941, p. 49. Southern California, both sides of United States.

*Branchiomaldane vincentii* Langerhans, 1881. See Berkeley and Berkeley, 1952a, p. 99. Northeastern Pacific Ocean, south to southern California.

### Family Maldanidae

*Asychis disparidentata* (Moore) 1904. See Berkeley and Berkeley, 1952a, p. 46. Western Canada south to southern California, in shallow silty benthos.

*Asychis lacera* (Moore) 1923. See Plate 32. See Hartman, 1960a, p. 149. Southern California, in shelf and slope depths, silt.

*Asychis similis* (Moore) 1906. See Berkeley and Berkeley, 1952a, p. 46. Alaska to western Mexico, in considerable depths, silt.

*Axiothella rubrocincta* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 51. Western Canada south to southern California.

*Axiothella rubrocincta complexa* Berkeley and Berkeley, 1941. Southern California, in shallow bottoms.

?*Glymenella cincta* (Saint-Joseph) 1894. See below.

*Glymenopsis cingulata* (Ehlers) 1887. See Hartman, 1960a, p. 144. West Indian region, southern California, in deep water.

*Euclymene delineata* Moore, 1923. See Hartman, 1960a, p. 147. Southern California, in slope depths.

*Euclymene grossa newporti* Berkeley and Berkeley, 1941. Southern California, in shallow depths.

*Euclymene reticulata* Moore, 1923. Southern California, in slope depths. Resembles *Euclymene zonalis* (Verrill) from New England; see Berkeley and Berkeley, 1952a, p. 48.

Euclymeninae, see below.

*Heteroclymene glabra* Moore, 1923. Southern California, in depths to 280 fms.

*Isocirrus longiceps* (Moore) 1923. See Berkeley and Berkeley, 1952a, p. 47. Southern California north to western Canada, in shelf and slope depths, silt.

*Lumbriclymene lineus* Hartman, 1960a, p. 142. Santa Catalina and Tanner basins, southern California.

*Maldane cristata* Treadwell, 1923. See Hartman, 1960a, p. 148. Southern California and western Mexico.

*Maldane glebifex* Grube, 1860. See Berkeley and Berkeley, 1952a, p. 45. Western Canada to southern California, in deep silts.

*Maldane sarsi* Malmgren, 1865. See Moore, 1923, p. 237. Western Canada to southern California; cosmopolitan.

*Maldanella robusta* Moore, 1906. See Berkeley and Berkeley, 1952a, p. 51. Alaska south to southern California, in slope depths.

*Nicomache lumbricalis* (Fabricius) 1780. See Berkeley and Berkeley, 1952a, p. 54. Western Canada to southern California, in slope and basin depths.

*Nicomache personata* Johnson, 1901. See Berkeley and Berkeley, 1952a, p. 54. Western Canada to southern California, in slope depths.

*Notoproctus pacificus* (Moore) 1906. See Berkeley and Berkeley, 1952a, p. 56 and Hartman, 1960a, p. 142. Alaska south to southern California, in slope and basin depths.

*Petaloproctus tenuis* (Théel) 1879. See Berkeley and Berkeley, 1952a, p. 55. Alaska south to southern California, western Europe.

*Praxillella affinis pacifica* Berkeley, 1929. See Berkeley and Berkeley, 1952a, p. 49. Western Canada to southern California, common in shelf to slope depths in sandy silt.

*Praxillella gracilis* (Sars) 1861. See Berkeley and Berkeley, 1952a, p. 50. Western Canada to southern California, in shelf and slope depths, sandy silt.

*Praxillella trifila* Hartman, 1960a, p. 146. Santa Catalina and San Nicolas basins, southern California.

*Praxillura maculata* Moore, 1923. See Hartman, 1960a, p. 143. Southern California, in deep basins to 510 fms.

*Rhodine bitorquata* Moore, 1923. See Berkeley and Berkeley, 1952a, p. 52. Western Canada and central and southern California, to 766 fms, silt.

### Family Oweniidae

*Myriochele gracilis* Hartman, 1955. Southern California, shelf and slope depths.

*Myriochele pygidialis* Hartman, 1960a, p. 149. Southern California, in outer deep basins.

*Myriowenia californiensis* Hartman, 1960a, p. 151. Shelf, slope and basin depths of southern California.

*Owenia fusiformis collaris* Hartman, 1955. Southern California, in shelf depths, sandy to gravelly sediments.

### Family Sabellariidae

All members of this family in California are represented in intertidal to shallow benthos, chiefly on rocky coasts.

*Idanthysus ornamentatus* Chamberlin, 1919. See Hartman, 1944c, p. 337. Northern California to Alaska.

*Phragmatopoma californica* (Fewkes) 1889. See Hartman, 1944c, p. 269. Southern California and western Mexico.

*Sabellaria cementarium* Moore, 1906. See Berkeley and Berkeley, 1952a, p. 109. Western Canada to southern California, chiefly below intertidal in the southern extent of its range.

*Sabellaria gracilis* Hartman, 1944. Southern California, shore to 25 fms, on under sides of stones.

*Sabellaria nanella* Chamberlin, 1919. San Francisco, California, rare.

*Sabellaria spinulosa alcocki*, *sensu* Berkeley and Berkeley, 1941, p. 51. Central and southern California, in enclosed bays.

### Family Pectinariidae

*Amphictene auricoma* (Müller) 1776. See Berkeley and Berkeley, 1952a, p. 105. Alaska south to western Mexico; western Europe; not specifically recorded from California.

*Cistenides brevicoma* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 106. Alaska south to southern California, in coarse sandy shallow bottoms.

*Pectinaria californiensis* Hartman, 1941. See Plate 31. See Hartman, 1944c, p. 268. California, in shelf to slope depths, silty sands.

*Pectinaria californiensis newportensis* Hartman, 1941. Newport Bay, California. Distinguished from the stem species by its longer, slenderer paleae.

Family **Ampharetidae**

- Amage anops* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 72. Washington to southern California.
- Amage arieticornuta* Moore, 1923. Off southern California, in abyssal depths.
- Amage longibranchiata* Hartman, 1960a, p. 153. Southern California, in long shore basins, silt.
- Amage scutata* Moore, 1923. See Hartman, 1960a, p. 153. Southern California, in 40 to 638 fms.
- Ampharete acutifrons* (Grube) 1860. See Moore, 1923, p. 201 (as *Ampharete grubei*). Western Canada to southern California, western Europe.
- Ampharete arctica* Malmgren, 1866. See Berkeley and Berkeley, 1952a, p. 65. Western Canada to southern California, cosmopolitan.
- Ampharete goesi* Malmgren, 1866. See Berkeley and Berkeley, 1952a, p. 66. Western Canada south to California. Cosmopolitan.
- Ampharete labrops*, new species. See below.
- Amphicteis glabra* Moore, 1905. See Moore, 1923, p. 207. Alaska south to California, in 49 to 239 fms.
- Amphicteis mucronata* Moore, 1923. See Berkeley and Berkeley, 1952a, p. 69. Western Canada to southern California, in depths to 654 fms.
- Amphicteis scaphobranchiata* Moore, 1906. See Berkeley and Berkeley, 1952a, p. 68. Western Canada to southern California.
- Amphisamytha bioculata* (Moore) 1906. See Berkeley and Berkeley, 1952a, p. 73. Northeastern Pacific Ocean to southern California, in shelf and slope depths.
- Anobothrus gracilis* (Malmgren) 1866. See Berkeley and Berkeley, 1952a, p. 67. Northeastern Pacific Ocean to southern California.
- Asabellides lineata* (Berkeley and Berkeley) 1943. See Berkeley and Berkeley, 1952a, p. 71, as *Pseudosabellides*. Western Canada, ? California off Newport Beach.
- Lysippe annectens* Moore, 1923. See Hartman, 1960a, p. 156. Southern California, basin, slope and shelf depths.
- Melinna denticulata* Moore, 1908. See Moore, 1923, p. 213. Southern California north to Alaska, dredged.
- Melinna heterodonta* Moore, 1923. See Hartman, 1960a, p. 157. Central and southern California, in considerable depths.

- Melinnampharete eoa* Annenkova, 1937. See Hartman, 1960a, p. 157. North Pacific Ocean, basins of southern California.
- Melinnexis moorei* Hartman, 1960a, p. 159. Southern California, in deep to abyssal depths.
- Samytha sexcirrata* (Sars) 1856. See Moore, 1923, p. 214. Northeastern Pacific Ocean south to California, in considerable depths.
- Schistocomus hiltoni* Chamberlin, 1919. See Hartman, 1960a, p. 159, and Berkeley and Berkeley, 1952a, p. 70. Southern California.
- Sosanopsis armipotens* Moore, 1923. Off southern California in 2228 fms. This species may be identical with *Melinnexis tentaculata* Treadwell, 1906, from the Hawaiian Islands.

### Family Terebellidae

- Amaeana occidentalis* (Hartman) 1944. Central and southern California, in shallow depths, ooze.
- Amphitrite cirrata* Müller, 1771. See Berkeley and Berkeley, 1952a, p. 86. Western Canada to central California, cosmopolitan in cold seas.
- Artacama coniferi* Moore, 1905. See Berkeley and Berkeley, 1952a, p. 74. Western Canada to southern California.
- Artacamella hancocki* Hartman, 1955. Southern California, in shelf depths.
- Eupolymnia crescentis* Chamberlin, 1919. Northern and southern California.
- Eupolymnia heterobranchia* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 88. Alaska south to southern California.
- Eupolymnia nesidensis japonica* (Moore) 1903. See Moore, 1923, p. 192, as *Polymnia*. Alaska south to California; Japan.
- ?*Hauchiella* sp. See Hartman, 1955a, p. 175. Southern California.
- Lanassa gracilis* (Moore) 1923, new combination. Off central California, in deep benthos. This species is transferred from *Leaena* to *Lanassa*, because it has 15 instead of 10 thoracic setigerous segments.
- Lanice conchilega* (Pallas) 1766. See Fauvel, 1927, p. 255. Southern California, cosmopolitan.
- Leaena caeca* Hartman, 1960a, p. 161. Santa Catalina basin, southern California.
- Leaena videns* Chamberlin, 1919. Laguna Beach, California, ?intertidal.
- Loimia medusa* (Savigny) 1818. See Hartman, 1944c, p. 271, as *L. montagui*. Southern California; warm seas of cosmopolitan areas.
- Naneva hespera* Chamberlin, 1919. Balboa, California, rare.

- Neoamphitrite robusta* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 85. Alaska south to southern California.
- Neoleprea spiralis* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 84. Western Canada to southern California.
- Pista alata* Moore, 1909. See Berkeley and Berkeley, 1941, p. 53. Southern California, in shallow depths.
- Pista brevibranchiata* Moore, 1923. (As *Pista brevibranchia* Chamberlin, 1919.) Central and southern California.
- Pista* nr *cristata* (Müller) 1776. See Berkeley and Berkeley, 1952a, p. 78. Western Canada south to southern California.
- Pista disjuncta* Moore, 1923. See Plate 31. See Hartman, 1960a, p. 160. Southern California, in shelf to basin depths, silt.
- Pista elongata* Moore, 1909. See Hartman, 1944c, p. 272 and Berkeley and Berkeley, 1952a, p. 80. Southern California to western Canada, intertidal and shelf depths.
- Pista fasciata* (Grube) 1870. See Berkeley and Berkeley, 1952a, p. 79. Alaska south to southern California; Red Sea.
- Pista fratrella* Chamberlin, 1919. See Berkeley and Berkeley, 1952a, p. 80. Southern California north to western Canada.
- Pista moorei* Berkeley and Berkeley, 1942. See Berkeley and Berkeley, 1952a, p. 81. Western Canada south to California.
- Pista pacifica* Berkeley and Berkeley, 1942. See Berkeley and Berkeley, 1952a, p. 80. Western Canada south to southern California, in shallow bottoms, bays, estuaries.
- Polycirrus californicus* Moore, 1909. See Hartman, 1944c, p. 276. Southern California, in mucoid and silty crevices of broken shells.
- Polycirrus perplexus* Moore, 1923. Southern California, in moderate depths, silt. This species has affinities with *Polycirrus caliendrum* Claparède, 1870, from southern Europe.
- Ramex californiensis* Hartman, 1944. Central California, intertidal.
- Scionella japonica* Moore, 1903. See Berkeley and Berkeley, 1952a, p. 86. Japan to California, rare off southern California.
- Scionides dux* Chamberlin, 1919. Crescent City, California; rare.
- Spinospaera oculata* Hartman, 1944. See Rioja, 1947, p. 524. Central California in Tomales Bay, intertidal, western Mexico.
- Streblosoma bairdi* (Malmgren) 1866. See Berkeley and Berkeley, 1952a, p. 82. Washington to California; western Europe.
- Streblosoma crassibranchia* Treadwell, 1914. See below.
- Terebella californica* Moore, 1904. See Hartman, 1944c, p. 271. Central and southern California, in roots of eel grass.

- Thelepus branchiatus* Treadwell, 1906. See Moore, 1923, p. 197. Hawaiian Islands and southern California, dredged.
- Thelepus crispus* Johnson, 1901. See Berkeley and Berkeley, 1952a, p. 83. Northeastern Pacific Ocean south to southern California.
- Thelepus hamatus* Moore, 1905. See Berkeley and Berkeley, 1952a, p. 82. Western Canada to southern California.
- Thelepus setosus* (Quatrefages) 1865. See Berkeley and Berkeley, 1952a, p. 83. Western Canada to southern California; cosmopolitan.

### Family Trichobranchidae

- Terebellides ehlersi* McIntosh, 1885. See Moore, 1923, p. 200. South Pacific Islands, southern California, dredged, rare.
- Terebellides stroemi* Sars, 1835. See Berkeley and Berkeley, 1952a, p. 75. Alaska south to western Mexico, cosmopolitan; common in shelf and slope to basin depths of southern California.
- Terebellides stroemi japonica* Moore, 1903. See Moore, 1923, p. 200. Japan and California.

### Family Sabellidae

- Chone ecaudata* (Moore) 1923. See Berkeley and Berkeley, 1952a, p. 124. Western Canada to southern California.
- Chone gracilis* Moore, 1906. See Berkeley and Berkeley, 1952a, p. 123. Alaska south to southern California.
- Chone infundibuliformis* Kröyer, 1856. See Berkeley and Berkeley, 1952a, p. 123. Western Canada to California, north Atlantic and Arctic oceans, usually boreal.
- Chone minuta* Hartman, 1944. Central California at Dillon Beach, in intertidal rocky habitats.
- Chone mollis* (Bush) 1904. See Hartman, 1944c, p. 279. Central and southern California.
- Distylidia rugosa* (Moore) 1940, new generic name. See below.
- Euchone analis* (Kröyer) 1856. See Berkeley and Berkeley, 1952a, p. 121. Greenland, northeastern Pacific Ocean; cosmopolitan.
- Euchone limnicola* Reish, 1959, p. 717. Alamitos Bay Marina, southern California.
- Euchone magna* Moore, 1923. Southern California, in 75 to 271 fms.
- Eudistylia polymorpha* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 113. Western Canada to southern California, in intertidal rocky habitats.

- Eudistylia vancouveri* (Kinberg) 1867. See Berkeley and Berkeley, 1952a, p. 113. Western Canada to southern California; in intertidal flats of sand and silt.
- Fabricia limnicola* Hartman, 1951. Southern California, intertidal in estuarine habitats.
- Fabricia sabella* (Ehrenberg) 1837. Northeastern Pacific Ocean; cosmopolitan. A recent account of this species by Banse, 1956, pp. 415-438, recognizes geographic subspecies.
- Hypsicomus californicus* (Treadwell) 1906. See Hartman, 1942a, p. 133. Central California, in shallow bottoms, boring in rocks.
- Megalomma circumspectum* (Moore) 1923. Southern California, in shelf depths, probably rocks.
- Megalomma splendida* (Moore) 1905. Western Alaska south to southern California, in moderate depths, rocky habitats.
- Megalomma* sp., bioculate. See below.
- Myxicola infundibulum* (Renier) 1804. See Berkeley and Berkeley, 1952a, p. 119. Western Canada to southern California, cosmopolitan.
- Potamethus mucronatus* (Moore) 1923. See Hartman, 1942a, p. 134. Off southern California, in great depths.
- Potamilla neglecta* (Sars) 1851. See Berkeley and Berkeley, 1952a, p. 116. Western Canada to southern California.
- Potamilla* sp. See below.
- Pseudopotamilla intermedia* Moore, 1905. See Hartman, 1938a, p. 19. Alaska south to southern California, shallow depths in rocky habitats.
- Pseudopotamilla ocellata* Moore, 1905. See Hartman, 1938a, p. 25. Alaska south to southern California, shallow depths in rocky habitats.
- Pseudopotamilla socialis* Hartman, 1944. See Hartman, 1944c, p. 282. Central California, in intertidal rocky crevices, associated with sponges.
- Sabella crassicornis* Sars, 1851. See Berkeley and Berkeley, 1952a, p. 114. Western Canada to southern California; cosmopolitan.
- Sabella media* (Bush) 1904. See Hartman, 1944c, p. 285. California, in intertidal depths of bays, rocky habitats.
- Schizobranchia insignis* Bush, 1904. See Berkeley and Berkeley, 1952a, p. 117. Western Canada south to California, chiefly northern.

Family **Serpulidae**

- Apomatus geniculata* (Moore and Bush) 1904. See Moore, 1923, p. 248. Japan, northern Pacific Ocean, south to southern California, in moderate depths, probably rocky or shelly sediments.
- Apomatus timsii* Pixell, 1912. See Berkeley and Berkeley, 1941, p. 56. Western Canada to central California, to 60 fms.
- Chitinopoma occidentalis* (Bush) 1904. See Hartman, 1948, p. 50. Western Alaska to California, in rocky shallow depths.
- Crucigera websteri* Benedict, 1887. See Berkeley and Berkeley, 1941, p. 57. Gulf of Mexico and southern California, in rocky habitats.
- Crucigera zygophora* (Johnson) 1901. See Berkeley and Berkeley, 1952a, p. 127. Alaska south to California, in rocky habitats.
- Eupomatus gracilis* Bush, 1904. California, intertidal and contaminant in aquaria; common.
- Eupomatus intereans* Chamberlin, 1919. Southern California at Laguna Beach. This species may be referable either to *E. gracilis* Bush or *E. uncinatus* Philippi.
- Eupomatus uncinatus* Philippi, 1844. See Berkeley and Berkeley, 1941, p. 56 (as *Hydroides*). Southern California, Mediterranean Sea; cosmopolitan.
- Hydroides norvegica* Gunnerus, 1768. See Berkeley and Berkeley, 1941, p. 56. Cosmopolitan, fouling on hulls of ships; Los Angeles harbor.
- Mercierella enigmatica* Fauvel, 1923. See Fauvel, 1927, p. 360. San Francisco Bay and its tidal streams, California, fouling on ships; cosmopolitan.
- Placostegus* sp. Southern California, in shallow depths, rocky habitats.
- Protis pacifica* Moore, 1923. See Hartman, 1955b, p. 51. Southern California, in deep basins, silt.
- Protula atypha* Bush, 1904. See Moore, 1923, p. 248. Pacific Grove, California, and southward.
- Protula superba* Moore, 1909. Central and southern California. *P. atypha* and *P. superba* may refer to the same species.
- Salmacina tribranchiata* (Moore) 1923. See Berkeley and Berkeley, 1952a, p. 131; Roja, 1941, p. 738. Northeastern Pacific Ocean to southern California.
- Serpula vermicularis* Linnaeus, 1767. See Berkeley and Berkeley, 1952a, p. 125. Both sides of the Pacific Ocean; cosmopolitan, common in intertidal rocky habitats.

- Spirobranchus spinosus* Moore, 1923. See Berkeley and Berkeley, 1941, p. 56. Southern California, intertidal, on exposed rocky surfaces.
- Vermiliopsis biformis* Hartman, 1960, p. 164. Southern California, on shells of lamp-shell, *Lacqueus*.
- Vermiliopsis cornuta* Rioja, 1947, p. 525. Western Mexico and southern California; trawled in San Pedro area, from rocky bottoms.
- Vermiliopsis multiannulata* (Moore) 1923. See Rioja, 1941, p. 734. Central and southern California, in shallow depths, rocky habitats.

### Subfamily Spirorbinae

- Dexiospira spirillum* (Linnaeus) 1758. See Berkeley and Berkeley, 1952a, p. 133. Alaska to southern California; cosmopolitan and common; attached to smooth surfaces such as stones, algae, in intertidal and shallow depths.
- Laeospira borealis* (Daudin) 1800. See Hartman, 1944c, p. 287. California; cosmopolitan; commonly on hard surfaces in intertidal zones.
- Laeospira mörchi* (Levinsen) 1884. See Berkeley and Berkeley, 1952a, p. 138. Western Canada south to western Mexico; littoral.
- Spirorbis rugatus* Bush, 1904. See Moore, 1923, p. 250. Alaska and California, in depths to 71 fms; attached to serpulid and chaetopterid tubes.

### Protodrilidae

- Saccocirrus papillocercus* Bobretzky, 1872. See below.

### Dinophilidae

- Dinophilus gyrotilatus* O. Schmidt, 1857. See below.

## PART II

### DESCRIPTIONS OF NEW AND LITTLE KNOWN SPECIES FROM CALIFORNIA

The species described below come mainly from southern California in depths below 3-10 meters, and were taken in the course of quantitative sampling of the sea bottom, from Point Conception to south of the Mexican border (see Hartman, 1955a, pp. 168-185; Barnard, Hartman and Jones, 1959, pp. 265-430.)

Since 1952, when quantitative sampling was begun in the San Pedro area, to 1960, more than 4000 quantitative samples have been taken which, with few exceptions, have yielded polychaetes most abundantly. The processing of these samples is still continuing and is far from complete. The polychaetes from the 13 offshore basins of southern California have been named and described in a separate report (Hartman, 1960a, pp. 78-164). Those from the 13 offshore canyons are being studied in another separate report (in preparation). The species from intertidal, shelf and slope depths are listed below, but it is expected that many additional species will be added as the numerous samples are processed, and their contents carefully examined.

Family **Polynoidae**  
Genus **Hesperonoë** Chamberlin, 1919

This genus has affinities with *Harmothoë* Kinberg, from which it differs in that notopodia and neuropodia each have setae of two kinds. Two species are previously known, both from intertidal areas of the northeastern Pacific Ocean and both commensal with non-related animals. Another species is newly described.

KEY TO SPECIES OF *Hesperonoë*

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|--|---|
| 1. Elytra smooth or nearly so, the surface tubercles, if present, minute and limited to the region in front of the elytraphoral scar . . . . .<br>1. Elytra with widely spaced tubercles over most of the upper surface; marginal fringe present unless worn away; the larger notosetae with pectinae reduced or obsolete; color in life deep salmon; commensal with ghost shrimp ( <i>Callianassa californiensis</i> ) . . . . .<br>2. The thicker notopodial setae with extensive pectinae; elytral margins smooth; intertidal and commensal with <i>Urechis caupo</i> (an echiuroid) . . . . .<br>2. The thicker notopodial setae with few or no pectinae; elytral margins slightly fimbriated; commensal, probably with <i>Listriolobus pelodes</i> (an echiuroid) . . . . . | 2<br><br><br><br><br><br><br><br><br><br><br><br> |
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1 *Hesperonoë hawanghaiensis* Uschakov and Wu, 1959, p. 35, from the Yellow Sea, is characterized by having subquadrate elytra adorned with a transverse row of elongate papillae behind the elytral scar.

**Hesperonoë laevis**, new species

Plate 1, figs. 1-6

Numerous collections were taken in shallow ocean bottoms, largely from an association of *Listriolobus pelodes* Fisher off Santa Barbara, California, and others from adjacent areas of southern California. The type collection is from Velero IV Station 5400, in 42 meters, where 31 individuals were taken in a single grab; other large concentrations are from Stations 5531 (12 specimens), 5410 (10), 4723 (8), 4983 (7); other stations had fewer individuals.

This is a small broadly depressed species; larger individuals measure 20 mm long and 8 mm wide. The elytra completely cover the dorsum (pl. 1, fig. 1). The prostomium is darker than the body, which is pale. Elytra are oval to subcircular in outline and pale, with a reddish brown mottling all over but most concentrated at the subperipheral posterior part. The prostomium is dusky gray and is medially marked with a longitudinal fissure extending through most of its length. There are 4 dark circular eyes; the anterior pair is larger and located just in front of the widest part of the lobe; the posterior smaller eyes are located near the posterior margin of the prostomium. The median antenna is more than twice as long as the short, lateral ones, which are about half as long as the prostomium (Pl. 1, fig. 1).

The first setigerous segment has large, bushy notopodial fascicles and smaller neuropodial bundles; the notopodial lobe is shorter than the corresponding neuropodial one. Thereafter the notopodial lobe is the less conspicuous. Setae of both rami are of two kinds. Acicula are single in a ramus, yellow, thick, and may project from the ends of the parapodia for a short distance. Notopodial setae include longer, slenderer (Pl. 1, fig. 5) and shorter, thicker (Pl. 1, fig. 6) ones, transversely pectinated.

Neuropodia terminate distally in a digitate superior lobe (Pl. 1, fig. 2) above the emergence of the aciculum. The setae consist of a few (about 8) supra-acicular, strongly pectinated setae (Pl. 1, fig. 4), and a larger, subacicular fascicle consisting of about 15 thicker, nearly smooth and shorter setae (Pl. 1, fig. 3). Elytra number 15 pairs and completely cover the dorsum; each is a large, thin disk. The first pair are subcircular or slightly oval in outline and have entire margins. The dorsal surface is pale or white with gray pigment arranged in a circular area over the outer half and a small white area over the elyrophoral scar; a gray crescentic area is present along the inner half of the surface. Other elytra are slightly reniform or excavate at the anterior margin; the margin is nearly smooth except for an occasional digitate papilla. Microtubercles are limited largely to an anteromedian area in front of the scar.

*Hesperonoë laevis* differs from other species of the genus as indicated in the key above. *H. complanata* is commensal with a ghost shrimp in intertidal zones; *H. adventor* is commensal with an echiuroid, in intertidal zones; both are reported from the northeastern Pacific Ocean, from western Canada to southern California. *H. laevis* has been recovered only from areas in which an echiuroid, *Listriolobus pelodes* Fisher, occurs; this echiuroid is most abundant in 20 to 40 meters depth off the Santa Barbara shelf. Grab samples taken from these bottoms have consistently yielded other polychaetes (*Ceratocephala crosslandi americana* Hartman, *Marphysa disjuncta* n.sp., *Poecilochaetus johnsoni* Hartman, *Prionospio pinnata* Ehlers, *Terebellides stroemi* Sars, 32 species of polychaetes in all) together with a large red nemertean, a seawhip, a phoronid, and small pelecypod mollusks (see Barnard and Hartman, 1959, pp. 6-11).

### Genus *Harmothoë* Kinberg, 1855

At least 7 species are represented in southern California; one is newly named.

#### KEY TO SPECIES OF *Harmothoë*

1. Without prostomial eyes; in deep soft bottoms of southern California . . . . . *H. tenebricosa*
1. With prostomial eyes . . . . . 2
2. Eyes located at frontal margin of prostomial peaks . . . . . 3
2. Eyes located behind prostomial peaks . . . . . 4
3. Parapodia laterally prolonged; dorsum marked with bars of pigment; in shallow soft bottoms of southern California . . . . . *H. priops*
3. Parapodia not prolonged; dorsum speckled; in intertidal areas of northern and central California . . . . . *H. imbricata*
4. Elytra with marginal fringe and coarsely areolated; in rocky habitats of California . . . . . *H. hirsuta*
4. Elytra without marginal fringe and not areolated . . . . . 5
5. Distal end of neuropodial falcigers deeply incised, with the accessory tooth long and slender; in soft bottoms, perhaps commensal . . . . . *H. lunulata*
5. Distal end of neuropodial falcigers excavate, with accessory tooth short; in green silts . . . . . *H. scriptoria*
5. Distal end of neuropodial falcigers with short accessory tooth and the tip of the tooth not extending distally as far as main

fang; notopodial setae much coarser than neuropodial ones;  
from Monterey Bay in rocky bottoms . . . *H. crassicirrata*

### **Harmothoë scriptoria** Moore, 1910

Moore, 1910, pp. 344-346, pl. 28, figs. 13-17.

The body consists of 39 segments; elytra number 15 pairs and barely cover the dorsum. The prostomium is approximately hexagonal, has 4 eyes arranged in a rectangle, with the anterior pair just in front of the midlength. The posterior eyes are near the posterior margin of the lobe. The median antenna is deeply embedded in the lobe so as to extend about half way through the prostomial length. Elytra are thin, delicate, smooth, lack cilia and tubercles except for a small area of tiny rounded, horny granules behind the elytral scar. The first elytra are subcircular; the second and third pairs are reniform, and others are larger, broader and less deeply emarginate at the frontal margin. Notopodial setae are about as thick as neuropodial ones. The notopodial setae are few in number and short; the neuropodial setae are distally bifid and appear clawlike at the tip because the accessory tooth is well separated from the terminal curved tip.

Specimens agreeing with the account of the original specimens, from Monterey Bay in 49-50 fms, green mud, differ mainly in that the prostomial eyes are much larger, and the posterior eyes are preceded by a pair of punctate spots, resembling minute eye spots. They come from Hueneme Canyon, Velero IV Sta. 6898, in 373 meters, silt.

### **Harmothoë lunulata** (delle Chiaje) 1841

Fauvel, 1923, pp. 70-71, fig. 25.

Hartman, 1944c, pp. 244-246, pl. 20, figs. 10-22.

Berkeley and Berkeley, 1948, p. 11.

This species has been found generally distributed in shelf and shallow slope depths of southern California, especially in silty or mixed bottoms. The prostomium has 4 small black eyes, with the anterior eyes in front of the middle, and the posterior ones near the hinder margin, of the lobe. The median antenna reaches forward to near the distal end of the palpi, and the paired antennae are less than a fourth as long. Notopodial setae are about twice as thick as neuropodial setae and shorter; they are nearly smooth and acicular. The superiormost are shortest, and they gradually increase in length inferiorly. They are weakly pectinated at the outer cutting edge. Neuropodial setae are of 2 kinds; a supra-acicular fascicle has 5 or 6 spinose, distally entire setae which are deeply serrated along

the cutting edge. The inferior fascicle consists of about 20 setae, longer and distally deeply bifid, with the accessory tooth not nearly reaching to the tip of the main fang. Acicula are dark yellow and occur singly in a ramus.

Elytra, numbering 15 pairs, have an entire margin and the surface is nearly smooth; in outline they are slightly lunulate. The surface is reticulated with color pattern, most concentrated at the outer lateral surface. Microtubercles are mainly limited to the median surface, in front of the elytral scar; each tubercle is a small rounded knob. The elytral margin lacks fringe.

*H. lunulata* has a wide distribution, extending from western Canada to southern California, and in European seas and cosmopolitan areas.

### **Harmothoë priops, new species**

*Collections.* The type is selected from VELERO IV Sta. 5402, 5.4 mi from Santa Barbara Point light, southern California, in 14 fms, dark green silt. Many additional specimens come from other shelf and slope depths of southern California, usually in sediments of silt, in shelly or mixed bottoms.

Length of an ovigerous adult is 7 mm; width is 0.7 mm; and segments may not number more than 39. The dorsum is crossed by broad reddish brown pigment bars, most intense between parapodial bases; a similar pigment forms a broad band across the lower lip. Some elytra, still attached to the body, are colorless except for crescentic areas about the elythrothorax scars.

The prostomium is approximately trapezoidal in shape, with the posterior length the longest; its frontal margin is deeply incised for the insertion of the median antennae, and the posterior margin is slightly overlaid by the first segment. There are 4 large prostomial eyes, the anterior pair located under the frontal peaks and fully seen only in ventral view. The posterior pair are on the posterior third of the prostomium, well within the lateral margins. In addition, about 10 to 20 irregularly dispersed small black spots are seen between the posterior eyes and continue behind and at the sides of them. The median antenna is about twice as long as the similar but shorter lateral pair; these are about half as long as the prostomium. The paired palpi are pale or white, thickest at the base and taper distally; they are about two and a half times as long as the prostomium.

The first segment has equally long dorsal and ventral cirri; they resemble the median antenna in shape and size. The ventral cirrus of the next, or first setigerous, segment is shoved medially so as to be at the

base of the parapodium and near the sides of the lower lip. The next ventral cirri are inserted like the others, at the midlength of the neuropodium.

Elytra probably number 15 pairs, as characteristic of the genus. All specimens are broken near the middle and most elytra have fallen away. Those that remain cover the dorsum completely and are approximately circular in shape; they are thin, translucent, and have entire margins; they lack tubercles.

Parapodia are lateral; the notopodium is reduced in size and emergent from the upper side of the neuropodium. Its setal fascicle is directed laterally in fairly compact bundles. Neuropodia are much longer, directed laterally; the lobe terminates in a long, slender triangular acicular lobe.

Notopodial setae are of a single kind; all are long and slender, distally whiplike and delicately serrated along the cutting edge. Neuropodial setae are of 2 kinds. The supra-acicular setae are similar to the notopodial setae in thickness and length and are similarly serrated along the cutting edge. The subacicular setae are slightly thicker, distally delicately bifid, and coarsely serrated along the cutting edge; they range from longest in the upper part of the series, to much shorter at the lower end.

*Harmothoë priops* is easily distinguished from other species of the genus in its small size (less than 10 mm long) and its characteristic barred pigment pattern. The anterior prostomial eyes are forward, under the prostomial peaks, and the posterior third of the prostomium is speckled with tiny black eyespots. Notopodial setae are unusually fine, hairlike, directed laterally, and upper neuropodial setae are similar to them.

It was frequently taken in shelf depths of southern California. Specimens are usually associated with *Harmothoë lunulata* (delle Chiaje) and many other small polychaetes.

### Family Sigalionidae

Genus *Pholoë* Johnston, 1839

Type *P. minuta* (Fabricius) 1780

*Pholoë glabra*, new species

Plate 2, figs. 1-8

*Collections.* Many individuals were taken in grab samples from Point Conception to south of the Mexican border; others are from Tomales Bay, California. They come mainly from shelf and slope depths below intertidal levels, down to 300 m, rarely to 1000 m, in sediments of fine

silt. Their greatest concentrations were noted in bottom samples at VELERO IV Stations 5354 (112 specimens), 4837 (41), 4835 (37), 5538 (33), 4785 (27), 5741 (27), 5748 (26), and others.

The body is depressed, linear and bluntly rounded at either end. Color in life and preserved is ivory white or the dorsum is somewhat rust-colored; the small prostomial eyes are black. Length of larger specimens is 10 to 15 mm and width to 2 mm. The body is completely covered dorsally by the overlapping elytral pairs. Segments number about 38 and elytra 26 to 28 pairs.

The prostomium consists of a pair of triangular lobes separated by a broad deep emargination (Pl. 2, fig. 1). The 4 eyes are at the sides, with those of a side nearly in contact. Prostomial peaks are weakly developed. The median antenna is thick at the base and tapers distally; it has a short, clavate style. A pair of equally long dorsal and ventral processes is directed forward to the palpi, beyond the tips of the median antenna. The paired palpi are thick, taper distally, and are directed forward. The everted pharynx has 18 terminal papillae and 2 pairs of dark amber jaws.

The ventral side of the body is flat and smooth, with a few small papillae along the lower lip in irregular arrangement. The first setigerous segment has parapodia directed obliquely forward. Its setigerous fascicles include a larger neuropodial, and a smaller notopodial bundle. Farther back the parapodia are directed laterally. A median one has a dorsal ramus with spreading fascicle of simple, distally tapering setae, and a ventral longer branch with composite falcigerous setae (Pl. 2, fig. 2). Acicula occur singly and are deeply embedded, or they project slightly from the distal end of the parapodial lobe.

The first elytra are suboval and nearly smooth except for a double row of small marginal and submarginal papillae along the outer side (Pl. 2, fig. 5). Farther back, elytra are subquadrate in shape (Pl. 2, fig. 6) and have papillae largely marginal at the outer and posterior edges. In far posterior segments the elytral marginal papillae become sparse and relatively larger in size. They are of several kinds; some are simple, slender, and terminate in a constricted tip (Pl. 2, fig. 4); others end distally in a petaloid process (Pl. 2, fig. 3); all are penetrated by a central canal, best seen in cleared mounted preparations. The anal end terminates in a pair of long, cirriform processes, as long as the last 6 to 8 segments.

Notopodial setae are of two kinds; the 4 to 6 supra-acicular ones are sharply bent at a nearly right angle in the distal end and serrated along the outer edge (Pl. 2, fig. 7). The subacicular fascicle has about 6 longer,

distally tapering smooth setae. Neuropodial setae are also in supra- and subacicular fascicles and all of one kind; they number 5 to 10 in a fascicle. The end of the shaft is ornamented with serrations and the appendage is sharply curved and has serrations near the base of the concave region (Pl. 2, fig. 8). Setae in anterior segments and those in superiormost position of parapodia have slightly longer appendages and the serrated regions are more extensive than comparable ones in other parts of neuropodia.

*Pholoë* is a small genus known for five species (see Hartman, 1959b, p. 117). The type of the genus, *P. minuta* (Fabricius) from Greenland, has been widely recorded from Arctic and boreal seas. It has a dorsum broadly exposed and differs in other respects from *P. glabra*. Its several subspecies or varieties include: *P. minuta tecta* Stimpson, from the Bay of Fundy, Canada, to which *P. minuta nans* Zachs, from the Murman coast, has been referred. *P. minuta caeca* Uschakov, from the Okhotsk Sea, is diagnosed by Uschakov (1955, p. 165) and distinguished from other species by details concerning the sizes of prostomial eyes and the elytral processes. *P. tuberculata* Southern (1914, p. 57) from Irish seas, is distinguished by having a conspicuous facial tubercle, the prostomium has a deep median incision, and the ventrum is papillated. The elytra leave the dorsum partly exposed. *P. synophthalmica* Claparède, from the Mediterranean Sea, has eyes far forward on the prostomium, and *P. dorsipapillata* Marenzeller, also from the Mediterranean Sea, has elytral markings consisting of concentric rings. Diagnoses of these may be consulted in Fauvel (1923, p. 119). *P. glabra* differs from these in its prostomial proportions; elytra are nearly smooth and have simple marginal papillae; neuropodial falcigers are serrated along the distal end of the shaft and the cutting edge of the appendage; and superior notosetae are sharply geniculate and coarsely serrated along the curved region.

*Pholoë glabra* has been found most abundant off Newport Jetty light, in 64 m, in green sandy silt, with temperature about 13.9°C. A bottom sample measuring about 42 liters, yielded 112 individuals, together with 40 other species of polychaetes, numbering in all 358 specimens. Other invertebrate animals included an ophiuroid, *Amphiodia urtica* (Lyman) with nearly 600 specimens, and smaller crustaceans, especially ostracods and amphipods, numbering more than 20 species and 300 specimens. The most abundant polychaetes were *Lumbrineris cruzensis* Hartman, *Pectinaria californiensis* Hartman, *Cossura candida* Hartman, *Prionospio malmgreni* Claparède, *Nephtys ferruginea* Hartman and *Ancistrosyllis tentaculata* Treadwell. Other adjacent areas, where *Pholoë glabra*

occurred abundantly, had sediments of olive green sandy silt, with the most commonly occurring polychaetes including *Chloeia pinnata* Moore, *Haploscoloplos elongatus* Johnson and *Axiothella rubrocincta* (Johnson).

Genus *Sthenelanella* Moore, 1910

Type *S. uniformis* Moore, 1910

This genus was erected for a single species from California. Another species was later referred to it, but it is considered probable that the two names refer to a single widely distributed species (see below).

*Sthenelanella uniformis* Moore, 1910

Moore, 1910, pp. 391-395, pl. 33, figs. 105-112.

Hartman, 1939, pp. 69-70, pl. 18, figs. 226-231.

?*S. atypica* Berkeley and Berkeley, 1941, pp. 26-27, figs. 1-3.

*Collections.* This species is very commonly taken in grab samples from shelf and slope depths of southern California, especially from silts, mixed bottoms, and in ophiurid associations. Specimens are encased in long, branched mucoid tubes which are removed from the animal with difficulty, and may measure 5 times as long as the specimen; the branches consist of lateral extensions of the main shaft of somewhat smaller diameter. Larger tubes are 10 to 15 cm long and 5 to 7 mm across.

*S. atypica* Berkeley and Berkeley (1941, p. 26), from Balboa and Newport Bays, southern California, was distinguished from *S. uniformis* by having *Sthenelais*-like setae in the anteriormost segments; but since *S. uniformis* also has such setae, the distinctions cannot be specific. The setae of the first few segments are small and easily overlooked; the more typical, short appendaged setae of most segments are more characteristic.

*S. uniformis* is very common in shelf and slope depths of southern California, and has been reported also from western Mexico and Ecuador.

Family *Pareulepidae*

Genus *Pareulepis* Darboux, 1899

*Pareulepis fimbriata* (Treadwell) 1901

Hartman, 1939, pp. 79-80, pl. 23, figs. 280-288.

Small specimens, measuring 2 to 4 mm long, have been taken off southern California in shallow, less than 16 meter, depths, in dark green

silt. They agree in all details with an earlier account (Hartman, 1939) based on specimens from Mission Bay, California.

The species is more widely recorded from both sides of tropical America and north to southern California, in shallow sandy sediments.

Family **Pisionidae** Levinsen

Genus **Pisione** Grube, 1857

**Pisione remota** (Southern) 1914

*Praegeria remota* Southern, 1914, pp. 61-63, pls. 7, 8.

*Praegeria remota* Fauvel, 1923, p. 125, fig. 45.

Hartman, 1955a, p. 181.

Many individuals have been taken in very shallow sea bottoms of gravelly sand. The species was best represented in VELERO IV Stations 2445 (many), 2788 (many), 6205 (more than 100) and others.

The body is long, slender, measures 5 to 8 mm long, and consists of 28 to 40 segments. The prostomium is indistinctly set off from the buccal segment. The ventral cirrus of the first segment is long, resembling a tentacular cirrus but shorter. All other ventral and dorsal cirri are globose and have a slender distal filament. The prostomium has 4 eyes; the two on each side are nearly coalescent; the anterior eyes are larger and farther apart than the posterior ones. Paired palpi are thick, long and directed forward. Tentacular cirri are about half as long and much slenderer. The tentacular segment has yellow embedded acicula.

Parapodia have setae of three kinds; a supra-acicular simple seta, thicker than the others, terminates distally in an oblique tip and has a transverse row of spinelets along its edge. A simple, slightly falcate long spine, in subacicular position, is followed by 3 composite falcigers in which the end of the shaft has a slight rounded knob, and the appendage is delicately toothed at the cutting edge. Acicula and setae are pale yellow.

In male individuals, setigerous segments 20 to 25 are modified and followed by 3 normal segments. In female individuals, ova are bright green and present in middle segments. The anal end has a pair of long, slender filaments inserted laterally.

Specimens from California and western Mexico differ from descriptions of *P. remota* from Europe, in that the superior simple setae of anterior and posterior segments are alike and do not have the distal denticulations shown by Southern (1914).

In California and western Mexico, *P. remota* is limited in its distribution to sediments of coarse red sand in shallow shelf depths. At its greatest concentrations, it is accompanied by other invertebrate animals

including the sand dollar, lancelets, and various other polychaetes numbering 27 species, of which the most characteristic are *Lumbrineris acuta* Verrill, *Aricidea* (*Cirrophorus*) *furcata* Hartmen, *Saccocirrus papillocercus* Bobretzky, *Pareurythoe californica* (Johnson), *Dorvillea articulata* (Hartman), *D. gracilis* (Hartman) and several species of phyllodocids and syllids.

*Pisone remota* is known from western and southern Europe, including the Black Sea, and from southern California and western Mexico, in shallow sandy sediments.

### Family Chrysopetalidae

This small family is known for few species in four genera (see Hartman, 1959b, p. 125).

#### KEY TO GENERA AND SPECIES

1. Without dorsal paleae (spines) . . . . . *Dysponetus*  
Levinsen (not known from California)
1. With dorsal paleae . . . . . 2
2. Prostomium with a conspicuous caruncle overlapping the peristomium; body short . . . . . 3
2. Body without a conspicuous caruncle; body long and consisting of many segments . . . *Bhawania* Schmarda (tropical only)
3. First segment with an asymmetrical ventral cirrus; dorsal paleae of two abruptly different kinds, broad and narrow; dorsum lacks gold lustre . . . . . *Paleanotus bellis*
3. First segment with paired cirri only; dorsal paleae of a single, intergrading kind or not abruptly different; paleae with golden lustre . . . . . *Chrysopetalum occidentale*

Genus *Chrysopetalum* Ehlers, 1864

*Chrysopetalum occidentale* Johnson, 1897

Johnson, 1897, pp. 161-162, pls. 5, 6.

*Collections.* This species is most commonly collected in intertidal or very shallow bottoms overgrown with encrusting bryozoans, hydroids, sponges, tunicates; and in pile faunas.

Individuals seldom measure more than 15 to 18 mm long, consist of about 60 to 63 segments, and are somewhat coiled. The prostomium is elongate, has 4 eyes in quadrate arrangement, with the anterior pair closer

together than the posterior, and in front of the insertion of the median antenna. The paired antennae are larger than the median one, which is inserted at the frontal margin of the prostomium. The large oral aperture is ventral, located at the middle of setigerous segments 3 to 5. A pair of large, thick palpi taper distally to truncate ends; they are directed forward beyond the ends of the paired antennae. The palpi are best seen in ventral view, as their bases are nearly in line with the paired first ventral cirri.

Parapodia 1 and 2 are fused and reduced; the first parapodium is smallest, represented only by a pair of biarticulate cirri, on either side, directed forward at the sides of the palpi, and by a weakly developed notopodial fascicle of slender setae. The second segment is normal in that dorsal and ventral cirri are accompanied by setigerous lobes and the normal complement of setae; this segment extends across the midventrum but in front of the oral aperture. From the third segment the parapodia are normal.

The caruncle is a conspicuous depressed globular lobe behind the prostomium, best seen when the paleae are pushed aside. It is less than half the prostomial size and thus notably smaller than that of *Paleanotus bellis* (below). Other details are given in Johnson (1897, p. 161).

*Chrysopetalum occidentale* is recorded from southern California and western Mexico, in intertidal depths, in rocky habitats.

#### Genus *Paleanotus* Schmarda, 1861

#### *Paleanotus bellis* (Johnson) 1897

*Heteropale bellis* Johnson, 1897, pp. 163-164, pl. 6.

*Collections.* This species has been taken intertidally, on piles, among tunicate and seaweed colonies, from *Mytilus* colonies, and from encrusting growths in shallow bottoms.

Mature individuals measure nearly 3 mm long by 0.5 mm wide and consist of 27 to 39 segments. The dorsum is concealed by the broad overlapping paleae. The prostomium is quadrate in outline, followed by a larger glandular caruncle overlying the first visible segment. The 4 eyes are large, in rectangular arrangement, and the median antenna is inserted at the frontal margin of the lobe, in front of the anterior eyes. The paired antennae are similar to the median one but inserted farther forward and ventrally. The paired palpi are broad, elongate oval, directed forward.

The first segment is asymmetrical in that the ventral cirrus of the right side is lacking; both dorsal and ventral cirri of this segment resemble

the prostomial antennae in having a long, clavate base and a short, slender tip. The second segment is the first normal one, has dorsal and ventral cirri, and fascicles of notopodial and neuropodial setae.

*Paleanotus bellis* is known from the northeastern Pacific Ocean from western Canada to western Mexico, in littoral zones.

### Family Phyllodocidae

This family is represented by at least 35 to 40 species in 14 genera. Most of them are difficult to identify from preserved collections because generic characters concern the exact number and locality of the anterior-most tentacular cirri, which are frequently lost on fixation, and the surface structures of the eversible proboscis which is often not properly everted. Dorsal and ventral cirri, which provide less reliable characters, are also frequently lost from study collections. Most of the strikingly colored patterns in life fade rapidly, and the excessive amounts of mucus secreted when specimens are killed, account for considerable shrinking of preserved materials. Composite setae, which occur in all members of the family, are not highly diagnostic in their gross structures, and the minute details are not readily distinguished.

#### KEY TO GENERA AND SPECIES

- |  |                      |
|--|----------------------|
| 1. With 2 pairs of tentacular cirri . . . . .                          | 2                    |
| 1. With 4 pairs of tentacular cirri . . . . .                          | 6                    |
| 2. Dorsal cirri auricular; body maculate and larger . . . . .          |                      |
| . . . . . <i>Eteone pacifica</i>                                       |                      |
| 2. Dorsal cirri not auricular; body not maculate and smaller . . . . . | 3                    |
| 3. Dorsal cirri triangular and foliaceous . . . . .                    | <i>Eteone lighti</i> |
| 3. Dorsal cirri subquadrate in shape . . . . .                         | 4                    |
| 4. Prostomium semicircular; body brownish . . . . .                    | 5                    |
| 4. Prostomium trapezoidal, longer than wide; body pale . . . . .       |                      |
| . . . . . <i>Eteone dilatata</i>                                       |                      |
| 5. Prostomium without eyes; inhabits bays or estuaries . . . . .       |                      |
| . . . . . <i>Eteone balboensis</i>                                     |                      |
| 5. Prostomium with eyes; not limited to bays . . . . .                 |                      |
| . . . . . <i>Eteone californica</i>                                    |                      |
| 6. Parapodia biramous . . . . .  | 7                    |
| 6. Parapodia uniramous . . . . .                                       | 8                    |

7. Ventral cirri of segment 2 similar to other tentacular cirri . . . . . *Notophyllum imbricatum*
7. Ventral cirri of segment 2 asymmetrical and foliaceous . . . . . *Hesperophyllum tectum*
8. First segment fused with prostomium; segments 2 and 3 free from one another; body elongate . . . *Hypocaulalia bilineata*
8. First segment not fused with prostomium; body long to short . . . . . 9
9. Segments 1 and 2 more or less fused with each other . . . 10
9. Segments 1 and 2 free from one another but sometimes more or less dorsally reduced . . . . . 12
10. Segments 1 and 2 fused and well developed; nuchal papilla present . . . . . *Paranaitis polynoides*
10. Segments 1 and 2 fused and dorsally reduced; nuchal papilla absent . . . . . 11
10. Segments 1 and 2 fused and dorsally reduced; nuchal papilla present . . . . . 20
11. Dorsal cirri cordate; prostomium with a median antenna; color in life bluish with metallic iridescence . . . . . *Genetyllis nigrimaculata*
11. Dorsal cirri ovate; prostomium without a median antenna; color in life salmon to reddish brown . . . *Genetyllis castanea*
12. Tentacular segments forming complete rings; prostomium with a median antenna; proboscis diffusely papillated . . . . . 13
12. First segment dorsally reduced; prostomium with or without a median antenna . . . . . 15
12. First segment dorsally and ventrally reduced but recognizable laterally; second segment dorsally reduced; prostomium with a median antenna . . . . . *Clavadoce splendida*
13. Tentacular cirri cirriform . . . . . 27
13. Ventral cirrus of segment 2 foliaceous and asymmetrical; other tentacular cirri cirriform . . . . . 14
14. Prostomium without eyes; median antenna nearly as long as paired lateral antennae; dorsal cirri lanceolate . . . . . *Steggoa gracilior*
14. Prostomium with eyes; median antenna inconspicuous; dorsal cirri distally truncate . . . . . *Steggoa californiensis*
15. Prostomium with a median antenna . . . . . 16
15. Prostomium without a median antenna, and with or without a nuchal papilla . . . . . 19

16. Tentacular cirri tapering distally . . . . . 17
16. Ventral tentacular cirrus of segment 2 foliaceous, others filiform; proboscis diffusely papillated; dorsal cirri lanceolate and longer than wide . . . . . *Sige montereyensis*
17. Posterior neuropodia slender, elongated, more than two and a half times as long as wide and distally truncate; dorsal and ventral cirri distally pointed . . . . . *Eumida tubiformis*
17. Posterior neuropodia not elongated . . . . . 18
18. Posterior dorsal cirri longer than wide . . . . . 19
18. Posterior dorsal cirri wider than long; dorsal cirri with very wide base and strongly imbricated; prostomium broader than long . . . . . *Eumida longicornuta*
19. Prostomium longer than wide; dorsum without transverse pigment bands . . . . . *Eumida sanguinea*
19. Prostomium wider than long; dorsum crossed by transverse bands of dark pigment . . . . . *Eumida bifoliata*
20. Proboscis with longitudinal rows of papillae near the base . . . . . 21
20. Proboscis with papillae in dispersed arrangement . . . . . 26
21. First 3 normal segments with parapodia and cirri greatly reduced . . . . . *Anaitides heterocirrus*
21. First 3 segments without reduced parapodia . . . . . 22
22. Dorsal cirri reniform in shape . . . . . *Anaitides longipes*
22. Dorsal cirri longer than wide, distally pointed to truncate and not reniform in shape . . . . . 23
23. Body segments each with 3 bars across the dorsum; pharyngeal papillae number to 9 in a row . . . . . *Anaitides williamsi*
23. Body segments each with 3 transverse lines across dorsum; pharyngeal papillae number to 12-15 in a row . . . . . *Anaitides groenlandica*
23. Body segments colored otherwise . . . . . 24
24. Body uniformly iridescent purplish brown; pharyngeal papillae number 10-12 in a row . . . . . *Anaitides medipapillata*
24. Body segments crossed by single broad bars with a middorsal pale spot . . . . . *Anaitides* nr. *multiseriata*
24. Body pale or somewhat punctate to maculate . . . . . 25
25. Dorsal cirri distally rectangular or rhomboidal; dorsum pale with dark punctate spots . . . . . *Anaitides mucosa*
25. Dorsal cirri oval or cordiform in shape; body pale or yellowish, pharyngeal papillae reddish brown at tips . . . . . *Anaitides madeirensis*

26. Proboscis with papillae all about equally small . . . . . *Phyllodoce ferruginea*  
 26. Proboscis with smaller papillae on proximal half and with longitudinal rugosities on distal half . . . *Phyllodoce* sp.  
 27. Dorsal cirri of middle segments elongate and lanceolate . . . 28  
 27. Dorsal cirri of middle parapodia subrectangular, distally truncate . . . . . *Eulalia strigata*  
 27. Dorsal cirri of median parapodia subovate or subcordate . . .  
 . . . . . *Eulalia levicornuta*  
 28. Prostomium with 2 lateral eyespots in addition to a pair of lenticulated eyes; dorsal cirri long and tumid . . . . .  
 . . . . . *Eulalia quadrioculata*  
 28. Prostomium without accessory eyespots; dorsal cirri thin and foliaceous . . . . . *Eulalia aviculiseta*

***Eumida bifoliata* (Moore) 1909, new combination**

*Eulalia* (*Sige*) *bifoliata* Moore, 1909, pp. 349-350, p. 16, figs. 31-34.

*Collections.* This species has been taken from shelf depths of southern California in sandy silts or shelly sediments.

The body is short, tumid and measures about 20 mm long. The prostomium is wider than long, has a straight posterior margin and is broadly rounded in front. The paired antennae are inserted in front; they are short, subequal and exceeded in size by the median antenna, in front of the large, dark, circular eyes. A dark diffuse pigment marks the anterior half of the prostomium, in front of the ocular area. The same dark pigment forms transverse bands across the body segments, and the dorsal cirri are diffused with dark pigment. Segment 1 is dorsally reduced; the second forms a short ring all around and has a setal tuft on either side. Dorsal cirri are foliaceous, about as broad as long, and do not greatly exceed in size the ventral cirri.

The fully everted proboscis is subcylindrical and smooth throughout its length. *Eumida bifoliata* is known from central and southern California, in depths to 149 fms.

Genus *Eulalia* Savigny, 1817

*Eulalia viridis* (Linnaeus) 1767

Fauvel, 1923, p. 160, fig. 57.

Berkeley and Berkeley, 1948, p. 48.

*Collections.* A single specimen comes from the coastal shelf at Gaviota pier, north of Santa Barbara, California, in 48 fms, green silty sand, shell and rock.

The body is pale and speckled dorsally and ventrally. The everted pharynx is diffusely papillated throughout its length. The median prostomial antenna is inserted far back, between the eyes. Tentacular cirri are clavate in shape; dorsal II is the longest and dorsal I the shortest. Dorsal cirri are approximately triangular, longer than wide and diffusely pigmented; ventral cirri are much smaller and elongate oval in shape.

This is typically a cold water species and not previously known from southern California. Its geographic distribution includes both Atlantic and Pacific oceans, in shallow or littoral depths.

Genus *Anaitides* Czerniavsky, 1882

*Anaitides* nr. *multiseriata* Rioja, 1941

*Phyllodoce* (*Anaitides*) *multiseriata* Rioja, 1941, pp. 684-687, pl. 1, figs. 2-6.

*Collections.* Many specimens come from southern California, chiefly in shelf depths, from silty sediments.

This is a small species; length is about 30 mm and width 1.5 mm. The dorsum is checkered with dark pigment. The prostomium is longer than wide and has a nuchal papilla at its posterior margin. The pair of eyes is located on the posterior third of the lobe. The distal half of the everted proboscis is marked with 6 longitudinal rows of large, low mounds, and the basal half has 12 pairs of rows of papillae which nearly cover the surface.

The specific identity is obscured by the fact that the individuals from southern California have a nuchal papilla, whereas the original account, based on a specimen from western Mexico, noted the absence of such a papilla. The species is known only from western Mexico and southern California.

### *Phyllodoce* sp.

*Collections.* VELERO IV Sta. 4768, off San Mateo Point, California, in 20 fms, green silt; Sta. 5111, off Point Hueneme, in 15 fms, gray sand; off Hyperion, in 17 fms, black sand; all from southern California in shallow depths below intertidal levels.

These specimens are uniformly small, measuring hardly 10 mm long. The body is transversely striped with black bands across the segments

and the middorsum is white or pale. Dorsal cirri are thin and foliaceous. The fully everted proboscis is unique in having its basal half covered with scale-like papillae in obliquely longitudinal rows, and its outer half with large, conical papillae in dispersed arrangement. Its distal end is bounded by 12 circlets of slenderer papillae, one row behind the other. The prostomium is wider than long, has 2 pairs of frontal antennae and a pair of large, subcircular dark eyes. A nuchal papilla was not seen. The first segment has a longer cirriform dorsal cirrus and a shorter, broader ventral one.

These specimens resemble a species described from the Yellow Sea, China, as *Phyllodoce papillosa* Uschakov and Wu (1959, p. 23) except that the California specimens are much smaller, measure only about 10 instead of 120 mm long. In both, the proboscis has its basal half with papillae in rows, and its distal half with dispersed papillae considerably larger than those on the basal half.

Family **Hesionidae**

The genera and species of this family are more numerous than indicated; only 5 species in 4 genera are named; some others known to be present have not been sufficiently studied to be generically or specifically assigned. This is partly due to the fact that specimens of this family are often very small, measuring less than 20 mm long, fragment on fixation and lose many of the diagnostic parts such as tentacular cirri, prostomial appendages and dorsal cirri either when taken in the field, or in the process of preservation. Colors in life, which are sometimes strikingly beautiful, are fugitive and seldom retained long enough to be accurately recorded.

KEY TO SPECIES

- 1. Parapodia uniramous or apparently so . . . . . 2
- 1. Parapodia distinctly biramous (Pl. 5, fig. 2) . . . . . 4
- 2. Second visible segment the first setigerous one; with 2 pairs of tentacular cirri . . . . . *Orseis lagunae*
- 2. Third visible segment the first setigerous one; with 6 pairs of tentacular cirri . . . . . 3
- 3. Larger, body more than 15 mm long; notopodial setae present as a small fascicle emerging from the dorsal surface of the neuropodium . . . . . *Ophiodromus pugettensis*

3. Smaller, body less than 7 mm long; notopodial setae absent . . . . . *Hesionella mccullochae*
4. Proboscis without terminal papillae . . . . . *Amphiduros pacificus*
4. Proboscis with terminal papillae . . . . . 5
5. Body transversely barred with brown pigment (Pl. 5, fig. 1); notopodial setae conspicuously dentate (Pl. 5, fig. 3) . . . . . *Oxydromus brunnea*
5. Body pale, not transversely barred; notopodial setae without dentations . . . . . *Oxydromus arenicolus glabrus*

Genus **Orseis** Ehlers, 1864

Type *O. pulla* Ehlers, 1864

The body is short and has few, widely separated segments. The prostomium has 3 antennae, 2 pairs of eyes and a pair of palpi directed forward. The first segment has 2 pairs of tentacular cirri. The second segment is the first setigerous one. Parapodia are uniramous. Dorsal cirri are cirriform; ventral cirri are present. The eversible proboscis terminates in a circlet of tapering papillae. The pygidium has a terminal and a pair of lateral processes. Three species are known (see Hartman, 1959b, p. 190); a fourth is here added.

### **Orseis lagunae**, new species

*Collection.* Laguna Beach, California, intertidal (1).

The single individual measures 15 mm long for 10 anterior segments, and width is 2.5 mm without, and 5.2 mm with, parapodia. The body is short, plump and grossly resembles that of *Hesione* spp. The shape of the prostomium and bases of antennae are very similar to those shown for *Orseis mathai* Gravier (1907, pl. 3, fig. 22) except that the antennae are more than twice as long in the specimen from Laguna Beach. The prostomial eyes are large and conspicuous; the anterior pair is at the widest part of the lobe, whereas the posterior pair is near the postectal margins of the prostomium. The paired antennae are inserted in front of the anterior eyes, and the median one is a little in front of the middistance between the anterior eyes. Palpi are very long, distally inflated and directed down so as to extend back beyond the first segment.

All antennae and dorsal and ventral cirri are very long, slender and cirriform, resembling one another; most of the dorsal cirri have been lost

but they may have exceeded in length the other processes. Neuropodia are long, have a compressed base and are directed laterally. The presetal lobe is extended laterally as a triangular lobe at the upper edge of the neuropodium; the postsetal portion is short, truncate, flangelike behind the setal series. All setae are composite, falcigerous, with the uppermost the longest and the lowermost gradually becoming shorter. The setal appendage is falcate, distally bifid with the lateral tooth some distance below the main fang and directed obliquely outward. The longest appendages are about twice as long as the shortest, but similar in other respects.

The species of *Orseis* are readily distinguished from other hesionids because parapodia are present from the second visible segment. The type of the genus, *O. pulla* Ehlers (1864, p. 188) from the Mediterranean Sea, is poorly known (see Fauvel, 1923, p. 248). *O. mathai* Gravier (1906, p. 386, and 1907, p. 22) comes from Port Charcot, Antarctica, in about 40 m. It most nearly resembles the species from California but is much smaller, measuring 3.6 mm long and consisting of only 18 setigerous segments; it has much shorter cirri and composite falcigers have comparatively much longer appendages. *O. fimbriata* Hartman (1953, p. 18) from South Georgia, has fimbriated nuchal processes.

*Orseis lagunae* has been taken only at Laguna Beach, California, in intertidal areas.

### Genus *Amphiduros* Hartman, 1959

Type *A. setosus* (Hessle) 1925

*Amphiduros* replaces *Amphidromus* Hessle (1925) which is pre-occupied. Parapodia are distinctly biramous. The prostomium has 3 antennae and 2 pairs of eyes in trapezoidal arrangement. The paired palpi are ventral. The eversible proboscis is smooth, unarmed, lacks papillae but terminates distally in a circlet of fimbriae. The buccal region is provided with 8 pairs of tentacular cirri.

### *Amphiduros pacificus*, new species

Plate 4, figs. 1-4

*Collections.* Stations 1441 (type), 1493 (2), 4788 (3), and other areas of southern California, in shelf depths.

This is a small, fragile species. Length of 32 segments is 16 mm; width 2 mm without and 4 mm with parapodia. Specimens are usually

taken with parts missing because cirri and antennae are weakly attached. Most characteristic are the distinctly biramous parapodia (Pl. 4, fig. 2) with full fascicles of setae, and the pale, nearly uncolored body.

The prostomium is wider than long, has 3 antennae as shown in Pl. 4, fig. 1. The two pairs of eyes are reddish and the two lateral eyes on each side are nearer together than the median distance between either pair. All tentacular cirri are long and cirriform. Segments 2 to 4 are distinct from one another; each has 2 pairs of long, tentacular cirri, resembling one another; segment 1 is dorsally reduced.

Notopodia (Pl. 4, fig. 2) have a long, triangular postsetal lobe extending distally slightly beyond the end of the long, slender, tapering pale yellow aciculum. The dorsal cirrus is long, cirriform, extends distally beyond the setal tips. The presetal lobe is somewhat longer and triangular. Notopodial setae are of two kinds; the 2 superior are simple and rodlike, and the 4 shorter are farther down, and furcate, with the distal tine very slender and much longer than the shorter tine, which is toothed along its outer edge.

Neuropodia are longer than notopodia; they taper distally and have a broad presetal lobe and an equally long, postacicular lobe. Each is penetrated by a straight, tapering yellow aciculum that extends distally to the end of the neuropodium. A supra-acicular fascicle contains about 6 long appendaged, tapering composite falcigerous setae (Pl. 4, fig. 4) resembling spinigers but terminating distally in a delicate bidentate tip. The subacicular fascicle contains about 10 similar composite setae, also with a bidentate tip (Pl. 4, fig. 3). The uppermost have the longest appendage and there is gradual decrease to the inferiormost. All neuropodial setae are of one kind. The ventral cirrus is long, slender and tapering.

*Amphiduros* is known for two other species (Hartman, 1959b, p. 182) both from Japan. They differ from *A. pacificus* in the details of parapodial lobes and setae.

### Genus *Ophiodromus* Sars, 1861

Type *O. flexuosus* (delle Chiaje) 1825

This genus is characterized by having nearly uniramous parapodia; the notopodium is represented by a reduced setal fascicle located on the upper side of the neuropodium. The prostomium is subquadrate, has 3 antennae with the unpaired or median one located at the frontal

margin of the lobe. The 4 eyes are in trapezoidal arrangement. Six pairs of buccal cirri emerge from the first 3 segments; they lack parapodia or setae. The eversible pharynx terminates in a circlet of fimbriae; there are no pharyngeal teeth. *Podarke* Ehlers (1864, p. 199) is synonymous with *Ophiodromus* (see Hesse, 1925, p. 21).

### *Ophiodromus pugettensis* (Johnson) 1901

*Podarke pugettensis* Johnson, 1901, pp. 397-398, pl. 3, figs. 23-25.

*Ophiodromus pugettensis* Hesse, 1925, pp. 20-21.

*Podarke pugettensis* Berkeley and Berkeley, 1948, p. 56, figs. 83, 84.

*Collections.* Many specimens come from western Washington (type locality) south to southern California and western Mexico, chiefly from intertidal and shallow shelf bottoms.

The body is short, plump, measures to 40 mm long, 5 mm wide and consists of 60 or more setigerous segments. In life it is usually reddish brown to purple or almost black and the prostomium has conspicuous red eyes in quadrate arrangement. The dorsum may be crossed by series of pale transverse lines, and the cirri and prostomial antennae are pale to nearly white. The prostomium is broadly rectangular, has 3 antennae with the unpaired one at the frontal margin and the paired ones inserted also in front but within the palpal bases. The prostomium is wider than long, with the two eyes on each side widely separated from those of the opposite side. The everted proboscis is cylindrical and terminates distally in a circlet of many fine, cilialike fimbriae, or is fringed. The buccal area has 6 pairs of cirri, with a pair on each of the first 3 segments; but the first segment is dorsally reduced and the second and third ones are shorter than those farther back.

The fourth segment is the third complete ring and the first one with parapodia and setae. Notopodial setae are present as inconspicuous fascicles, emerging from the base of the notopodial cirrophore. At sexual maturity the number and length of setae are increased and individuals swarm to the surface of the sea.

Specimens are either free living, or commensal, usually with asteroid echinoderms, especially of the genera *Asterina* and *Luidia*. They are to be found also among eel grasses, under stones and in rocky crevices. When taken from subintertidal areas, they are sometimes recovered with another equally small hesionid, most easily distinguished from *Ophiodromus pugettensis* by being white or pale (see *Oxydromus arenicolus glabrus*, below).

*Ophiodromus pugettensis* ranges in the northeast Pacific Ocean in intertidal zones and in shallow ocean depths.

Genus *Oxydromus* Grube, 1855

Type *O. fasciatus* Grube, 1855

*Oxydromus arenicolus* La Greca, 1946, *glabrus*, new subspecies

*Oxydromus arenicolus* La Greca, 1946, pp. 273-276, figs. 4-9. (stem species)

*Collections.* Hundreds of specimens come from shallow shelf benthos of southern California, north to Tomales Bay, California.

The body is pale, uniformly unpigmented and resembles that of *Ophiodromus pugettensis*, with which it is frequently taken, in size, general shape and proportions. The two are most easily distinguished in that this one has parapodia distinctly biramous, and it has 8, instead of 6, pairs of buccal cirri. The everted proboscis has a circlet of 10 widely spaced, triangular papillae, whereas that of *Ophiodromus pugettensis* has a circlet of pilose fringe.

The prostomium is quadrate, about twice as wide as long, and has 2 pairs of eyes, the two on each side near together on the posterior half of the prostomium. The 3 prostomial antennae are located at the frontal margin of the lobe, with the paired ones nearly as long as the prostomium and the median one less than half as long. The palpi are nearly as long as the paired antennae and directed forward. The everted proboscis is cylindrical and terminates in 10 widely spaced papillae; there are no jaws.

The 8 pairs of tentacular cirri are either distinctly articulated or the joints are obscure. Parapodia are biramous and the notopodium is both slenderer and shorter than the neuropodium. The embedded acicula are pale to dark amber in color, occur singly in a ramus and are only slightly emergent from the distal end of the acicular lobes. Notopodia have fascicles of long, slender, acicular setae. Neuropodia have long appendaged, composite falcigers in the upper part of the fascicle, and gradually shorter, but similar, ones in the subacicular part of the series. Dorsal and ventral cirri are smooth, cirriform, not articulated.

The subspecies, *O. arenicolus glabrus*, differs from the stem *O. arenicolus* La Greca (1946) from the Mediterranean Sea, in that tentacles and cirri are smooth instead of articulated. The ventral cirri of *glabrus* are slender, cirriform, instead of thick, tapering.

*Oxydromus arenicolus glabrus* reaches its greatest concentrations in shallow benthos of silt and mixed bottoms and is most frequent near outfalls, where it is associated with *Ophiodromus pugettensis* (see above).

***Oxydromus brunnea*, new species**

Plate 5, figs. 1-4

*Collections.* Velero IV Stations 2393, 2402, 4822, 5102, and some others, all in considerable depths off southern California.

This is a small, fragile species; length of an ovigerous adult with 29 setigerous segments is 7.5 mm with, and 6.5 mm without, everted proboscis. The prostomium and dorsum are conspicuously marked with reddish brown pigment, chiefly as transverse bars across the dorsum (Pl. 5, fig. 1). In fresh specimens, the anterior half of the prostomium is dark to within the area of the anterior eyes; a similar pigment forms a dark band across the posterior border of the prostomium, and similar narrow dark bars cross the segments at regular intervals, through the first 7 segments; from the eighth segment and farther back the pale intersegmental stripe of more anterior segments resembles a middorsal pentagonal area. The same dark pigment extends over the upper part of parapodia. The ventrum, dorsal and ventral cirri and everted proboscis and setae are pale.

The prostomium (Pl. 5, fig. 1) is trapezoidal in shape, widest in back when the proboscis is everted. The 4 eyes are in crescentic arrangement with the anterior pair widest apart and the posterior pair slightly behind and closer together. A median antenna is lacking; the paired antennae are inserted at the frontal margin; they have short cirrophores and long, slender styles.

Tentacular cirri number 8 pairs; all may be long and slender but were lost before the illustrations (Pl. 5, fig. 1-2) were completed. Dorsal cirri are long, slender, probably articulated, with the first pair the longest, and those of later segments proportionately shorter. Before handling, the articles numbered 12 to 20, but the joints were subsequently lost. Ventral cirri are also articulated, but shorter than the corresponding dorsal ones.

The everted proboscis (Pl. 5, fig. 1) is broadly flaring and terminates distally in a circlet of many (more than 70) small papillae; they are smallest at middorsal and midventral positions. Parapodia are biramous (Pl. 5, fig. 2); notopodial setae are smaller and shorter than the corresponding neuropodial ones; the former are of a single kind,

simple and uniquely dentate (Pl. 5, fig. 3). Neuropodial setae are composite falcigerous, with the appendage (Pl. 5, fig. 4) of varying lengths; the longest are in supra-acicular and the shortest in subacicular position.

*Oxydromus brunnea* has been taken from moderately deep bottoms off southern California, in sediments of rock, gravel and mixed debris; it is associated with ophiuroids, holothuroids, a sabellarian, *Sabellaria cementarium*, and rock-inhabiting species.

### Family SYLLIDAE

This family is well represented in California, but the species are mainly poorly known and others may remain undescribed. A few are newly named below.

#### KEY TO GENERA AND SPECIES

1. Body extremely depressed; all cirri subspherical . . . . .  
     . . . . . *Plakosyllis americana*
1. Body otherwise . . . . . 2
2. Palpi absent; body very small, parasitic on ampharetids .  
     . . . . . *Calamyzas ?amphictenicola*
2. Palpi present; not known to be parasitic . . . . . 3
3. Without ventral cirri . . . . .  
     . . . . . *Autolytus varius* and *Autolytus* spp.
3. With ventral cirri . . . . . 4
4. Dorsal cirri articulated . . . . . 6
4. Dorsal cirri not articulated . . . . . 5
5. Overall size small, length 4 mm or less; palpi fused . .  
     . . . . . EXOGONINAE 10
5. Body larger; palpi present and not fused. EUSYLLINAE 12
6. Pharynx sinuous . . . . . *Campesyllis minor*
6. Pharynx straight . . . . . 7
7. Body depressed; pharynx with a chitinous, coarsely denticulate crown or trepan; dorsal cirri with many short articles . .  
     . . . . . *Trypanosyllis* spp.
7. Body not greatly depressed; pharynx armed with a chitinous tooth . . . . . 8
8. Setae entirely simple; usually in sponges . . . . .  
     . . . . . *Haplosyllis spongicola* var.

8. Setae entirely composite . . . . . 9
8. Setae partly simple, partly composite . . . *Syllis* spp.
9. Composite setae entirely falcigerous . . . *Typosyllis* spp.
9. Composite setae partly falcigerous, partly spinigerous . .  
. . . . . *Langerhansia heterochaeta*
10. Without prostomial and peristomial antennae and tentacles  
(Pl. 8, fig. 1) . . . . . *Exogonella brunnea*
10. With prostomial antennae and peristomial tentacles (Pl. 7,  
fig. 1) . . . . . 11
11. Surface of body papillate; peristomial tentacles one pair; giz-  
zard short, barrel-shaped . . . . . *Sphaerosyllis* 15
11. Surface of body not papillate; peristomial tentacles one pair,  
small; gizzard long, cylindrical . . . . . *Exogone* 17
11. Surface of body not papillate; peristomial tentacles two pairs  
. . . . . *Brania* sp.
12. Prostomium posteriorly covered by a nuchal flap . . . 20
12. Prostomium not covered by a nuchal flap . . . . . 13
13. Body short, consists of few segments; palpi free from one an-  
other; proboscis long and coiled; peristomium with a pair of  
flaps or epaulettes . . . . . *Amblyosyllis* sp.
13. Body longer, consists of more numerous segments; palpi some-  
times partly fused; proboscis straight; peristomium without  
epaulettes . . . . . 14
14. Distal end of pharynx smooth . . . *Pionosyllis gigantea*
14. Distal end of pharynx denticulate . . . *Eusyllis assimilis*
15. With 3 pairs of eyes, including one pair far in front . .  
. . . . . *Sphaerosyllis erinaceus*
15. With 2 pairs of eyes . . . . . 16
16. Parapodia from fourth segment provided with capsules con-  
taining rods . . . . . *Sphaerosyllis hystrix*
16. Parapodia without rods in capsules . . . *Sphaerosyllis pirifera*
17. Prostomial antennae thickest at base, tapering distally; com-  
posite falcigerous setae distally bifid . . . *Exogone gemmifera*
17. Prostomial antennae not thickest at base; composite falcigerous  
setae distally entire . . . . . 18
18. Composite setae entirely falcigerous . . . *Exogone verugera*
18. Composite setae partly spinigerous . . . . . 19
19. Composite falcigerous setae with many teeth along cutting  
edge . . . . . *Exogone lourei*

19. Composite falcigerous setae with 3 or 4 teeth along cutting edge (Pl. 7, fig. 2) . . . . *Exogone uniformis*
20. With black transverse bars across dorsum; larger in size . . . . *Odontosyllis phosphorea*
20. Without black transverse bars; smaller in size . . . . *Odontosyllis parva*

Genus *Autolytus* Grube, 1850

Type *A. prolifera* (Müller) 1788

*Autolytus varius* Treadwell, 1914

Treadwell, 1914, pp. 237-238, fig. 102.

Berkeley and Berkeley, 1948, p. 70, fig. 102.

This is a small, nearly colorless species. Adult females with brood sack measure to 30 mm long, consist of about 60 segments, with the body divisible into an anterior region of 14, a median region of 30, and a posterior region of about 16 segments. The prostomial eyes consist of a pair of larger anterior and a pair of much smaller posterior ones. *A. varius* is known from California to western Canada (Berkeley and Berkeley, 1948, p. 70).

*Autolytus ?cornutus* Agassiz, 1862

Plate 6, fig. 2

Agassiz, 1862, pp. 390, 2 pls.

Hartman, 1944b, p. 338, pl. 13 [45], figs. 4, 6.

Epitoke male individuals (Pl. 6, fig. 2) are occasionally taken in plankton tows off southern California. There are 5 pre-epitokal segments, about 24 with long swimming setae, and 11 posterior to the epitokal region. There are no nuchal epaulettes.

The species is more widely known from the eastern United States.

*Autolytus* spp.

Other species of *Autolytus* have been noted from kelp holdfasts in southern California. One species has the dorsum pale, crossed by black pigment bars, one on every other segment for 5 bars, followed by 6 double bars on successive segments; the posterior half of the body is pale. The prostomium is pale and has 4 red eyes in trapezoidal arrangement; peristomial tentacles are long and cirriform.

Another species in the same habitat (in kelp holdfasts) has both dorsum and ventrum marked with dark spots, usually three to a segment dorsally and the same number ventrally; the median series of spots is the largest.

Still another species, also in this habitat, has the dorsum marked with 4 black, longitudinal lines, extending through most of the body length but fading posteriorly. Stolon formation is indicated at segment 14.

*Hesperalia nans* Chamberlin (1919, p. 9) from southern California, may be referable to one of these species, unless the so-called neurocirri refer to ventral cirri. The dorsum was described as light fulvous, with series of blackish, transverse lines across the dorsum such that there are 4 segments between each 2 dark lines.

Genus *Exogone* Oersted, 1845

Type *E. naidina* Oersted, 1845

*Exogone uniformis*, new species

Plate 6, fig. 1; Plate 7, figs. 1-4

*Exogone lourei* Hartman, 1960a, p. 90.

*Collections.* This species is frequent in samples from the shallow shelf of southern California; the type specimen was selected from Station 5102.

Total length is 3.7 mm; number of segments 41. The body is linear, with smooth surface, pale or white and without color markings. Some individuals have the pharynx partly everted showing a sharply pointed, very slender tooth directed forward. The muscular gizzard is visible through the body wall and extends through six and a half segments (Pl. 7, fig. 1). Some mature individuals have juveniles attached to the ventral side of the body (Pl. 6, fig. 1), through setigerous segments 15-25 or 16-31; the first 14-15 and the last 10 segments lack gonadial products. Some smaller individuals, believed the same species, have long natatory setae present from segments 20 through 34; these segments are followed by five with normal setae.

The prostomium is quadrate, wider than long, has 3 antennae, all equally short or the median one considerably longer than the others and distally expanded; there is no uniformity regarding the length and thickness of these antennae. Eyes number two pairs, in trapezoidal arrangement, on the prostomial lobe behind the antennal insertion. The palpi are large, broad, fused medially and have a slight median notch at the distal forward end (Pl. 7, fig. 1). Peristomial cirri are short and fusiform. The posterior end of the body terminates in a pair of long, slender anal cirri attached laterally, and divergent distally.



Parapodia are lateral throughout and provided with setae and acicula that are remarkably uniform. The superiormost seta is a simple, distally curved spinelike one with terminal serrations (Pl. 7, fig. 3). This is followed by a long, spinigerous composite seta (Pl. 7, fig. 4) and by 3 equally short composite falcigerous setae (Pl. 7, fig. 2). The composite spiniger has an appendage that is delicately toothed along the cutting edge and the end of the shaft is thick, rounded so that the appendage is seldom seen in lateral view; typically it is seen only from its narrow edge, resulting in a view that gives the appendage the appearance of a long tailed whip. Composite falcigers have a similar thick shaft but the appendage is less flexible and has 3 or 4 slender teeth along the concave cutting edge. These parts can be positively identified only by special, oil immersion preparations; they have been checked and found remarkably uniform from one parapodium to another, and between specimens.

*E. uniformis* shows resemblance to *E. lourei* Berkeley and Berkeley (1938, p. 44) first described from western Canada. The latter is larger, measuring to 8, instead of 4 mm long. Falcigerous setae differ in that the cutting edge has numerous teeth. *E. uniformis* has been found very abundantly present in shallow benthic samples in southern California. It is usually associated with other members of the subfamily, notably species of *Sphaerosyllis*.

The specific name refers to the uniform character of its setal components.

#### Genus *Exogonella*, new genus

##### Type *E. brunnea*, new species

This genus is distinguished from other members of the subfamily EXOGONINAE in that the prostomium and peristomium lack antennae and cirri. The palpi are completely fused and resemble the prostomium of the eunicid genus *Nematonereis*. The pharynx terminates in a sharp, slender yellow tooth located anteriorly. Parapodia are provided with composite falcigerous setae and simple acicular setae. A single species is named.

#### *Exogonella brunnea*, new species

##### Plate 8, figs. 1-5

The type was selected from Velero IV Sta. 5102; other individuals come from shallow shelf stations of southern California.

This is a small species and resembles a nematode; the body is very

dark brown, smooth, has short parapodia and cirri, and is easily overlooked. Length is about 4 mm; width 0.3 mm; number of segments about 48. Preserved specimens are usually nearly straight, linear or somewhat coiled in their posterior end. When retracted, the esophagus is visible through the body wall in segments 1 to 3, and the cylindrical gizzard in segments 4 to 8 (Pl. 8, fig. 1). The prostomium is wider than long, rectangular, has 4 small eyespots on its posterior half, with the 2 of a side far apart and near the outer ectal margin of the lobe. The large, fused palpi are directed forward, together longer than wide, and the anterior end bluntly conical (Pl. 8, fig. 1). The first segment lacks cirri or parapodia; it is a smooth ring behind the prostomium. The second segment is the first setigerous. All parapodia are small, lateral, provided with composite setae. Ventral cirri are short, conical lobes, without special structure. The body terminates posteriorly in a pair of lateral, spherical processes (Pl. 8, fig. 3) at the sides of the anal pore.

Setae are entirely composite; the uppermost are long appendaged spinigerous (Pl. 8, fig. 4) and the lowermost are short appendaged falcigerous (Pl. 8, fig. 5); they number about 5 in a parapodium. The shaft is widened distally and oblique, to accommodate the base of the appendage. The uppermost have an appendage with cutting edge deeply dentate, with about 20 oblique teeth (Pl. 8, fig. 4); the lowermost are much shorter, with teeth numbering 3 or 4 (Pl. 8, fig. 5).

*Exogonella brunnea* may be more abundantly present than present records indicate; it is so small that it passes through the mesh of screens employed in quantitative studies.

Genus *Plakosyllis* Hartman-Schröder, 1956

Type *P. brevipes* Hartman-Schröder, 1956

*Plakosyllis americana*, new species

Plate 33, fig. 1

*Collection.* Sta. 5768 (5 specimens).

The type is selected from Velero IV Sta. 5768, 10½ mi from Point Loma, California, in 18½ fms, sediment of red sand. The longest individual measures 4 mm long by 0.9 mm wide and consists of 75 to 100 segments. The body is very flat, depressed, and resembles that of an elongated spintherid; its form suggests that the species may be commensal. All antennae, tentacular and dorsal cirri and anal appendages are globular, and ventral cirri are short and triangular.

The prostomium is about 3 times as wide as long, widest at the mid-length, and has 4 red eyes in a nearly transverse row on the dorsal side. The gizzard, seen through the body wall, is short cylindrical, located in 3 successive segments, and resembles that of *Sphaerosyllis* species. The posterior third of the body is opaque white, filled with gonadial products. The 3 prostomial antennae are short, globular, frontally attached and well separated from one another; these, together with the peristomial cirri, are slightly larger than dorsal cirri of body segments, but otherwise similar.

Parapodia are compressed and overlap those of adjacent segments, reminiscent of the elytra of scale-worms. They are uniramous, supported by single, thick, yellow acicula that taper distally and terminate in a slightly falcate tip. The projecting setae, numbering 10 to 15 in a fascicle, are of a single kind. All are composite, falcigerous, and the distal appendage is entire and has a dentate cutting edge (Pl. 33, fig. 1); the shaft is smooth, much thicker than the appendage and widest in a transverse direction so that its greatest width is not observed when the appendage is seen in lateral view.

*Plakosyllis americana* is to be compared with only one other species, *P. brevipes* Hartman-Schröder (1956, p. 87) described from the Mediterranean Sea. The latter measures 1.5 to 3 mm long, consists of 40-44 segments and has eyes in trapezoidal arrangement. *P. americana* consists of 75 to nearly 100 segments, is longer, and the details of composite falcigers differ.

*P. americana* has been taken off southern California, in red sands, associated with *Branchiostoma* (a lancelet), *Hemipodus borealis* Johnson, species of *Sphaerosyllis*, and numerous other kinds of polychaetes.

Genus *Odontosyllis* Claparède, 1863

Type *O. fulgurans* (Audouin and Milne Edwards) 1833

*Odontosyllis phosphorea* Moore, 1909

*Odontosyllis phosphorea* Moore, 1909, pp. 327-329, pl. 15, figs. 8-10;  
Berkeley and Berkeley, 1948, p. 82.

*Hesperalia californiensis* Chamberlin, 1919, p. 9.

*Collections.* This species occurs frequently in southern California, in shallow depths, in rocky habitats with kelps and encrusting growths.

Length of mature individuals is 20 to 30 mm. The dorsum is pale ivory or yellowish and is crossed by broad black bands. The large nuchal flap is dark and covers much of the prostomium, including the 4 large,

prostomial eyes which are also dark and have pale lenses. Prostomial antennae, peristomial cirri and dorsal cirri are cirriform and lack articulations. Dorsal cirri are alternately long and short.

*Hesperalia californiensis* Chamberlin (1919, p. 9) from Laguna Beach, California, is here considered identical. It was characterized by having antennae and dorsal cirri articulated, but this is here interpreted as wrinkling due to preservation. In other respects there is complete agreement with *Odontosyllis phosphorea* Moore.

This species is known more extensively from western Canada to southern California, in littoral depths, associated with rocky substrata.

### *Odontosyllis* spp.

Another species of the genus was taken off Palos Verdes, California, (Sta. 3050) washed out of a kelp holdfast from a colony of *Chaetopterus variopedatus*. The dorsum is deep purple, and dorsal and ventral cirri are ivory white. Parapodia are provided with up to 15-20 composite falcigers in which the distal end of the shaft is oblique, thick, and supports a falcigerous appendage with a sharp triangular tooth near its basal cutting edge. Acicula are yellow, distally truncate and hammer-shaped.

Still another species of the same genus was taken in a grab sample 10 miles out from Point Loma, in 17 meters, in rocky habitat with *Ophiothrix* and *Strongylocentrotus* spp. (echinoderms). This one has 5 dark, longitudinal stripes extending throughout the length of the body; a large, semicircular nuchal flap and the rest of the body, including cirri, are pale. Composite falcigers have an appendage that is bifid, with the accessory tooth located near the middle of the cutting edge, nearer the distal fang. Acicula are yellow, distally somewhat clubbed, and terminate in a constricted tip.

Genus *Typosyllis* Langerhans, 1879

Type *T. krohnii* (Ehlers) 1864

The most frequently encountered member of the SYLLINAE in grab samples taken from shallow littoral benthos of southern California is a species of *Typosyllis*, approaching *T. armillaris* (Müller) (see below).

*Typosyllis* nr. *armillaris* (Müller) 1771

*Syllis* (*Typosyllis*) *armillaris* Fauvel, 1923, p. 264, fig. 99.

*Syllis armillaris* Berkeley and Berkeley, 1948, p. 72, fig. 104.

*Collections.* Numerous individuals taken from shallow littoral bottoms in silty and mixed sediments.

The body is long, linear, and measures 25 to 40 mm long. The prostomium is wider than long, has 3 pairs of eyespots with the anterior-most at the frontal margin of the prostomium, the middle pair behind the middle of the lobe, and the posterior pair at the posterior end of the lobe. The median antenna is inserted on the posterior third of the prostomium, midway between the middle and posterior paired eyes, and the paired lateral antennae are at the sides, between anterior and middle paired eyes. They have about 9 articles each. Palpi are large, long, free to the base and directed forward.

The pharynx is long, cylindrical and extends posteriorly through 7 to 9 segments; it is followed by the muscular gizzard extending through the next 6 or more segments. The distal end of the proboscis has a large anterior tooth and terminates in a circlet of 10 widely spaced short papillae.

Parapodia have dorsal cirri with few, weakly separated articles, numbering at most 3 to 6, sometimes appearing nearly smooth. They are about twice as long as the corresponding ventral cirri. Setae are entirely composite and distally bifid. In addition, at the upper end of the setal fascicle one usually sees 2 long, projecting acicula, resembling simple setae; they are slightly falcate and distally bifid; the concave edge is delicately dentate. The specific identity is in some doubt because of this feature.

*Typosyllis armillaris* has been reported from cosmopolitan areas, in littoral zones.

Genus *Calamyzas* Arwidsson, 1932

Type *C. amphictenicola* Arwidsson, 1932

?*Calamyzas amphictenicola* Arwidsson, 1932

*Collection.* Four and a half miles west of Oceanside pier, California, in 90 fms, green silt (2).

Two individuals were found attached to the base of branchiae of an ampharetid, *Amphiteis scaphobranchiata* Moore. The larger is ovigerous, measures 0.39 mm across and 1.3 mm long; the large ova can be seen as transverse bands across the segments. The body is broad, dorsally convex, ventrally flattened and resembles a small maggot. Dorsal and ventral cirri are long, cirriform and resemble each other. Setae are of a single kind; all are composite falcigerous, with the appendage

distally entire and the cutting edge finely dentate. The end of the shaft is toothed.

This genus and species are previously known only through the original account, based on specimens found on the branchiae of *Amphicteis gunneri* (Sars), from Sweden. The present find is from another host, far removed from the type locality, so that the specific identity may be questioned. *Amphicteis scaphobranchiata* is common on shelf and slope depths of southern California, but the parasite, in spite of continued search of the host, has not been seen again.

Family SPHAERODORIDAE

Four recorded species, and another to be expected, are included in the key below.

Genus *Sphaerodorum* Oersted, 1843  
Type *S. gracilis* (Rathke) 1843

KEY TO SPECIES OF *Sphaerodorum*

- 1. Parapodia provided only with simple, falcigerous setae . . . . . *S. papillifer*
- 1. Parapodia with composite, falcigerous setae only . . . . . 2
- 2. Dorsal papillae disposed in single transverse rows on each segment . . . . . *S. sphaerulifer*
- 2. Dorsal papillae uniformly scattered over the dorsum in diffuse arrangement; neuropodial cirri very short . . . . . 3
- 2. Dorsal papillae limited to a pair to a segment and located proximal to the parapodia . . . . . *S. biserialis* (not known from California)
- 3. Body short and tumid; in shallow inshore sediments . . . . . *S. minutum*
- 3. Body long and slender; in deep to abyssal ocean depths . . . . . *S. brevicapitis*

*Sphaerodorum papillifer* Moore, 1909

Moore, 1909, pp. 333-334, pl. 15, figs. 11, 12.  
*Ephesia papillifer* Berkeley and Berkeley, 1948, p. 27.  
*Collections.* Point Conception, California, in 12 fms, Santa Monica canyon in 40 fms, to southernmost California, in depths to 500 fms; on rocky bottoms.

This is a long, vermiform species; length is 20 to 30 mm. Parapodia are provided with simple falcigers only. The dorsum has paired rows of large, lateral papillae and many, uniformly small, over the middle. The species is recorded from western Canada to southern California, in slope depths, rocky habitats.

*Sphaerodorum minutum* (Webster and Benedict) 1887

*Ephesia minuta* Webster and Benedict, 1887, pp. 728-729, pl. 4, figs. 64-66.

Berkeley and Berkeley, 1948, pp. 27-28, fig. 34.

*Collections.* The most frequently encountered sphaerodorid in grab samples from shelf depths along the coast of southern California.

Overall length, based on specimens from southern California, is 1.5 to 2 mm; width 0.35 to 0.5 mm; number of segments 16 to 20. The entire dorsum has conspicuous papillae in dispersed arrangement, but usually 5 to 7 rows on a segment can be distinguished. The opaque gizzard is visible through the body wall, in setigerous segments 3 to 6. Ovigerous individuals have few, large ova continued through segments behind the gizzard to the second last one. Large ova measure about 0.7 mm across. The posterior end of the body terminates in a pair of larger subspherical lateral papillae, and 2 much smaller ones medially.

Parapodia are short, have globular dorsal cirri, and setae entirely composite, with the appendage curved and the cutting edge smooth.

The species is known from New England, western Canada and southern California, in shallow depths.

Family EUNICIDAE

Genus *Marphysa* Quatrefages, 1865

Type *M. sanguinea* (Montagu) 1815

This genus is represented in California by 5 species.

KEY TO SPECIES OF *Marphysa*

1. Parapodial branchiae at most simple filaments, present on many parapodial segments . . . . . *M. stylobranchiata*
1. Branchiae composite and present on few to many segments . . . . . 2
2. Branchiae palmately branched . . . . . 4
2. Branchiae pectinately branched . . . . . 3
3. Composite setae spinigerous (Pl. 10, fig. 3); subacicular simple hooks black and acicular . . . . . *M. disjuncta*

3. Composite setae falcigerous; subacicular simple hooks yellow and distally bifid, falcigerous . . . . . *M. conferta*
4. Prostomium semicircular, with very short antennae; composite setae falcigerous . . . . . *M. mortenseni*
4. Prostomium medially incised, provided with moderately long antennae; composite setae spinigerous . . . . . *M. sanguinea*

***Marphysa disjuncta*, new species**

Plate 10, figs. 1-3

*Collections.* Hundreds of individuals come from many localities in southern California, from Point Conception south to San Diego, chiefly in depths of 50 to 100 meters, in sediments of fine green silt to sticky mud. The type is selected from VELERO IV Sta. 2107.

A larger individual measures 130 mm long, 5 mm wide and consists of more than 100 segments. Branchiae are abruptly present on a short anterior part of the body. The 5 prostomial antennae are smooth and about twice as long as the prostomium (Pl. 10, fig. 1). The prostomium is trapezoidal in shape, widest in front, and its anterior margin is slightly incised at the middle. Antennae are inserted in a straight transverse line near the posterior margin of the prostomium. A pair of large, oval-shaped spots behind the bases of the outer paired antennae may represent eyes. The peristomium or first segment is a smooth ring without parapodia or cirri, as typical of the genus.

Branchiae are abruptly present from segment 13 or 14, and number about 15 pairs; they have up to 20 filaments each, in pectinate arrangement, and all of the filaments are about equally long and continue distally to near the end of the rachis. The first and last branchial pairs are only slightly smaller than the intermediate ones.

Parapodia are lateral throughout. The ventral cirrus is at first broadly conical and becomes thicker and shorter farther back but is never pad-like. In postbranchial segments it is again slenderer and subconical, and resembles those of anterior segments.

Setae are of 4 kinds; throughout the body the simple setae occupy the uppermost positions of the fascicle. Composite spinigers are in nearly equally large bundles, but in more inferior positions. Prebranchial and branchial parapodia have only simple, pointed and composite, spinigerous setae, disposed in thick, spreading fascicles and accompanied by 2 nearly equally thick acicula; they are black along most of their length except

at the tip, which is paler and extends distally slightly beyond the parapodial lobe. In postbranchial segments the setae diminish in number and are accompanied by comb-setae and subacicular spines. The comb setae number 3 to 5 in a fascicle and are located just above the acicula; they are flaring distally and terminate in an oblique straight edge with 8 to 10 coarse striations (Pl. 10, fig. 2). Composite spinigers (Pl. 10, fig. 3) have a shaft ending in a thick, knoblike smooth, or slightly spinous articulation, and a slender, knifelike appendage tapering to a slender tip. Subacicular setae are first present in postbranchial segments, located at the inferior ends of the setal fascicles; they occur singly in a parapodium, are black at the base and fade distally; they are acicular or slightly curved.

The maxillary apparatus is well developed. The ventral mandibles are white and broadly flaring at their free ends. The maxillae include a pair of long forceps (=maxilla I); II has 7 teeth right and 5 teeth left; III has none right and 7 left; IV has 6 right and 3 left, and V is a small flat plate on either side.

Some individuals (from Sta. 4817) are enclosed in a tube, resembling that of *Diopatra ornata* Moore, but less ornamented externally and more closely fitting the body of the specimen. The body is flesh colored, has a narrow reddish brown stripe extending across the dorsum of each segment at segmental grooves; immature specimens have little or no pigment pattern.

*Marphysa disjuncta* differs from other species from California as indicated in the key above. It bears a resemblance to *M. bellii* (Audouin and Milne Edwards) from France, which also has branchiae abruptly present on a few anterior segments (see Fauvel, 1923, p. 410), but the latter has falcigerous, not spinigerous composite setae, and the prostomium is anteriorly rounded, not incised.

*M. disjuncta* has been found most abundant south of Point Conception to Ventura light, California, in depths of 28 to 48 meters, in sediments of green silt to medium green sand, and in temperatures of 11 to 15°C. Grab samples taken from such bottoms averaging 45 to 60 liters of sediments, have yielded up to 35 larger specimens of *M. disjuncta*, and many other wormlike animals. These include *Listriolobus pelodes* Fisher, an echiuroid, *Glycera robusta* Johnson, *Diopatra ornata* Moore, *Notocirrus californiensis* Hartman, *Pista disjuncta* Moore, *Ceratocephala crosslandi americana* Hartman, *Poecilochaetus johnsoni* Hartman, *Dissoma franciscanum* Hartman, *Cossura candida* Hartman, *Prionospio*

*pinnata* Ehlers, *Pholoë glabra* Hartman, *Pectinaria californiensis* Hartman and *Chloëia pinnata* Moore. At maximum occurrence, *Marphysa disjuncta* has numbered 35 specimens, associated with 53 species of polychaetes numbering 329 specimens, and other invertebrates bringing the total to 125 species and 1397 specimens of metazoan animals.

### *Marphysa conferta* Moore, 1911

Moore, 1911, pp. 252-254, pl. 16, figs. 29-34.

*Collections.* This species has been recovered from slope depths, in rocky bottoms, from Santa Monica south to southernmost parts of California.

It was known previously only through a single specimen taken off Santa Rosa Island, in 38-40 fms, which measured only 24 mm long by 1.9 mm wide for 57 segments; it was a female filled with ova. Based on present finds, total length is 33 mm, width 2 mm. The prostomium is pale, diffused with red medially, and the peristomium is a bright red ring. The body is salmon colored and the ova in the posterior region of the body are deep yellow. Branchiae are abruptly present from the seventh setigerous segment and present on the 10 following segments; they are absent thereafter. Branchial filaments number 5 to 7, are in pinnate arrangement, and long so as to meet middorsally.

Ventral cirri are cirriform through 4 segments and padlike from the fifth segment; the change is gradual. Parapodial setae are of 4 kinds. Composite falcigers are distally bifid and occur in dense, subacicular fascicles; they diminish in number going back. Comb setae have 16 to 18 short, mucronate teeth and one lateral margin has a long, slender filament. Subacicular hooks are yellow, distally bifid and hooded. Acicula are embedded, yellow rods, tapering distally to a point.

*M. conferta* is known only from southern California, in depths to 76-200 meters, in rocky habitats.

### *Marphysa mortenseni* Monro, 1928

Monro, 1928, pp. 86-88, figs. 9-12.

Hartman, 1944a, p. 129.

*Collections.* Single specimens come from scattered areas, off Redondo Beach, California, south to Cortes bank, off the western Mexican border, in depths of 20-100 meters, in rubbly or shelly bottoms.

This species is characterized by having a prostomium broadly rounded in front; antennae are very short, cirriform, and there are no eyes.

Branchiae are first present from about segment 25, continue posteriorly through a long region, and have up to 6 filaments in subpalmar arrangement. The composite setae are falcigerous.

*M. mortenseni* is known from the Pacific side of Panama and southern California, in moderate depths, in rocky or rubby sediments.

### *Marphysa stylobranchiata* Moore, 1909

Moore, 1909, pp. 249-251, pl. 7, figs. 8-12.

Hartman, 1944a, pp. 127, 129.

*Collections.* Numerous individuals come from central California in intertidal depths; another was dredged off Long Point, Santa Catalina Island (VELERO IV Sta. 2393), in 250-270 fms.

This is a large, long species, measuring about 100 mm long. The prostomium is about half as long as wide, and consists of 2 broadly rounded lobes. The 5 antennae are smooth and short, with the median or longest one about as long as the prostomium. Eyes are small and seen by pushing the antennal bases apart. Branchiae are simple, tapering filaments, first present from about segment 16 to 20, and gradually increase in size so that by segment 22 they are about as long as the accompanying dorsal cirrus. Branchiae are largest in median segments and diminish in size posteriorly. Setae are of 3 kinds; the most abundant are the simple setae which are curved, slightly limbate and distally pointed. Composite falcigers have a bifid tip and are distally hooded; they are most numerous in anterior segments. Comb setae are most conspicuous in posterior segments. Acicula number 3 to 5 in anterior parapodia, are black at the base and have pale tips; they taper distally.

*M. stylobranchiata* is typically a northern species, ranging from Monterey and northward, in intertidal rocky habitats. It has been recovered only once from southern California, in slope depths from the leeward side of Santa Catalina Island.

### *Marphysa sanguinea* (Montagu) 1815

*Marphysa californica* Moore, 1909, pp. 251-253, pl. 7, figs. 13-18, pl. 8, figs. 19, 20.

Hartman, 1944a, pp. 126-128, pl. 8, figs. 179-183.

*Collections.* San Diego Bay, California, lower end, in clayey silt flats.

This species is distinguishable from others of the genus as indicated in the key above. In California it is limited largely to southern waters, in estuarine flats, and has been found most abundant in intertidal flats of San Diego Bay, where it is collected in quantity as fish bait.

The species has a cosmopolitan distribution in warm seas.

### Family ORBINIIDAE

Genus *Naineris* Blainville, 1828

Type *N. quadricuspida* (Fabricius) 1780

*Naineris* nr. *quadricuspida* (Fabricius) 1780

Fauvel, 1927, pp. 23-24, fig. 8.

*Collection.* 7.1 mi east of Long Point, Santa Catalina Island, in 370 fms. (1).

A single mature individual was collected; it agrees most nearly with *Naineris quadricuspida*, known from north Atlantic waters. The prostomium is broadly rounded in front and lacks eyes. The peristomium is a smooth ring without parapodia. Branchiae are large and present from the fourth setigerous segment; they are continued posteriorly beyond the middle region of the body; a posterior end is lacking. The inner branchial bases, in abdominal segments, leave a broad, middorsal space bare. Transition from thorax to abdomen is after the eleventh setigerous segment.

Thoracic neuropodia have an anterior row of about 12 distally pointed setae, followed by more posterior rows of curved acicular spines, approximately 12 in a row for 3 rows. These spines or uncini are distally bluntly rounded, slightly genticulate along their exposed length, and transversely barred along the outer side; they lack a distal hood.

The notopodial postsetal lobe is cirriform, elongated, present from the first parapodium and continued long into abdominal segments, and diminishing in length in postmedian segments. In this respect, the specimen differs from typical *Naineris quadricuspida* (see Fauvel, 1927, fig. 8).

This individual was associated with a deep, rock-bottom fauna including siliceous sponge, a galatheid crab, a psolid holothurian, and some other animals (see Hartman, 1955a, p. 139).

*Naineris quadricuspida* is elsewhere known from north Atlantic and boreal seas.

## Family PARAONIDAE

Genus *Paraonis* Grube, 1872Type *P. tenera* Grube, 1872*Paraonis platybranchia*, new species*Collections.* VELERO IV Station 6421 (7).

This is a long, slender species. Length is about 15 mm, width 0.3 mm, segments number about 65-75. The prostomium and prebranchial segments are pale; the postbranchial segments are dull green, and the posteriormost segments are again pale. The prostomium is prolonged forward and acutely pointed; it is longer than wide and broadest in its ocular area. Eyes consist of 2 small black spots, one on either side near the postectal margin of the prostomium. The first segment or peristomium is poorly marked off from the prostomium and best seen ventrally because of the deep, midventral, longitudinal notch forming the lower lip. This is followed by 3 setigerous segments having biramous setigerous parapodia without branchiae. The setal fascicles of these segments are lateral; the individual setae are long, slender and hairlike.

Branchiae are first present from the fourth setigerous segment and continue posteriorly on 25 to 29 segments. Branchiae are broad, strap-like and taper distally; all are about equally large, or the anterior and posteriormost are gradually smaller; they are directed upward so that the 2 of a pair nearly meet middorsally.

Parapodia are most conspicuous because of the long, very slender notopodial, postsetal lobe; this extends distally to half of the free length of the setae. These slender lobes continue throughout the length of the body. The corresponding neuropodial parts lack these slender lobes. Setae are all of one kind, slender, hairlike, and thus differ from those of other known species of *Paraonis* (see Hartman, 1957, p. 329).

The posterior end of the body terminates in a flat, auricular, ventral lobe, about twice as wide as the last few segments; a pair of slender, cirriform processes is attached on the dorsal side of the flat lobe. The anal pore is on the dorsal side, behind the last body segment.

*Paraonis platybranchia* has been found only at one station, taken 0.3 mi from near the United States-Mexican border, at latitude 32° 32' 00" north, longitude 117° 07' 30" west, in a depth of 18 ft, in sediments of coarse gray sand. The species was associated with *Prionospio malmgreni* Claparède, *Dispio uncinata* Hartman, *Nephtys caecoides* Hartman, and an *Eteone* sp.

The specific name refers to the straplike character of the branchiae.

### Family APISTOBRANCHIDAE

This is a small family known for few genera and species. Each genus is monotypic, and their species come from widely scattered geographic areas. They are *Apistobranchnus tullbergi* (Théel) 1879, from Novaya Zembla, *Ethocles typicus* Webster and Benedict, 1887, from Massachusetts, and *Skardaria fragmentata* Wesenberg-Lund, 1951, from Iceland.

These species share few features in common. All have uniramous parapodia provided only with simple, distally pointed setae. Dorsal cirri occur on segments 1 to 7, and lack prostomial eyes or antennae. *Apistobranchnus*, for which the family is named, lacks paired palpi; they are present in *Ethocles* and *Skardaria*, giving them a spionid-like appearance.

#### KEY TO SPECIES

1. Without paired palpi; first 4 segments with ventral lobes . . . . . *Apistobranchnus tullbergi*
1. With paired, spionid-like palpi . . . . . 2
2. First 3 segments with ventral lobe . . . . . *Ethocles typicus*
2. Second to fourth segments with ventral lobe . . . . . *Skardaria fragmentata*

Genus *Skardaria* Wesenberg-Lund, 1951

Type *Skardaria fragmentata* Wesenberg-Lund, 1951

*Skardaria fragmentata* Wesenberg-Lund, 1951

Wesenberg-Lund, 1951, pp. 59-65, figs. 1-4.

*Collections.* Scattered individuals come from VELERO IV Stations 4817 (3), 4785 (2), 4820 (4), 5558 (1), 5741 (2).

All are small, posteriorly fragmented; the largest measures about 5 mm long and may be 2/3 complete. The prostomium is broadly rounded in front, lacks eyes, and has at its posterior margin the insertion of the short palpi; they resemble straplike branchiae or spionid-like palpi.

The first branchiae, resembling the palpi, are present from the second setigerous segment. Branchiae are continued on successive segments through at least 12 pairs. The first 7 parapodial pairs differ abruptly from the others; they are provided with full, dense fascicles of long,

distally pointed setae, most bushy on setigerous segments 2 to 5. The fifth parapodium has a broad, thin flange below the parapodial base; its free margin is conspicuously fimbriated. The sixth is similarly fimbriated, and the ninth has a series of 9 to 10 longer, larger lobes, forming transverse series. These features are reminiscent of similar parts present in some disomid species.

These specimens are considered identical with *S. fragmentata* Wesenberg-Lund (1951, p. 59), first described from off Iceland, in 6 meters, on an ocean bottom of shells and clay.

*Skardaria fragmentata* remains known only through these records.

### Family SPIONIDAE

This family is represented in California by at least 44 species in 15 genera. Generic distinction is generally easy and has been simplified in previous works (see Fauvel, 1927, p. 27; Hartman, 1941, p. 292; Berkeley and Berkeley, 1952a, p. 13). The species described below are either new to science, or new Pacific records.

#### Genus *Dispio* Hartman, 1951

Type *D. uncinata* Hartman, 1951

*Dispio uncinata* Hartman, 1951

Hartman, 1951b, pp. 87-90, pls. 22, 23.

*Collections.* Numerous specimens from shallow (10 to 30 ft) depths of southern California, in sandy sediments.

Length is about 10 mm. The prostomium is nerinid, longer than wide and tapers forward as a slender anterior palpode. There are 4 small black eyes, disposed in a wide open crescent, embedded in its posterior half. The peristomium is prolonged forward at the sides of the lobe to near the anterior end of the prostomium and elevated as a pair of conspicuous thin wings, concealing the scars of attachment of the paired palpi; it is similar to the condition in *Prionospio pinnata* Ehlers.

Branchiae are present from the first setigerous segment and continue posteriorly through most or all of the body segments; they are fused with the postsetal notopodial lobe. Accessory branchiae, characteristic of the genus *Dispio*, are first present from the ninth segment, located on the posterior side of postsetal lobes; the first one is a single small lobe; farther back the size increases and also the number of branches, to 10 or more in digitate arrangement.

The notopodial postsetal lobe of the first parapodial segment is fimbriated; its corresponding neuropodial lobe is expanded and somewhat trifoliate.

Setae in anterior segments are arranged in vertical series; all are slender, distally pointed. Neuropodial, acicular hooded hooks are first present from segment 25, alternating with slender, longer, distally pointed setae; this arrangement continues posteriorly to the end of the body.

A posterior end, presumably of this species, has 3 long, cirriform appendages, each longer than the combined length of the last 5 segments; this is in contrast to *D. uncinata* described from the Gulf of Mexico.

These specimens have been compared with the type collection and found to agree well in all details but the character of the anal appendages.

*Dispio uncinata* is known from western Florida, Gulf of Mexico, in shallow water, and from southern California, in shallow sandy benthos.

Genus *Spio* Fabricius, 1785

Type *S. filicornis* (Müller) 1776

*Spio punctata*, new species

Plate 11, figs. 1-3

*Spio*, n.sp. Hartman, 1955a, p. 130.

*Collections.* Many individuals were taken from shelf depths, especially on the leeward and eastern sides of Santa Catalina Island; the type was selected from VELERO IV Sta. 5095, a mile from East End Light, Santa Catalina Island, in 40 fms where the grab took 0.81 cuft of fine greenish brown sand.

A larger individual measures about 60 mm long; the body is widest in the branchial region and tapers posteriorly. The prostomium is broadest in front, approximately pentagonal in shape, and terminates postmedially in a short V-shaped nuchal lobe located between the palpal bases. Near its midlength, and in front of the palpal insertions, the prostomium has numerous small black eyespots in dispersed arrangement (Pl. 11, fig. 1), or they may be so faded (in alcohol preservation) as to be nearly invisible.

Branchiae are present from the first parapodial segment; they are long, cirriform, free from the postsetal lobe (Pl. 11, fig. 2), and increase in width farther back; they continue through the anterior and into middle regions, for about 30 to 50 segments.

Interramal pouches, resembling those in species of *Laonice*, are present in mature individuals; they occur first on the last several branchial segments and attain their greatest development in the goniadal, or postbranchial segments.

Hooded hooks are first present in neuropodia from about the thirtieth, or last branchial segment; they are accompanied by long, pointed setae at the upper end of the fascicle, and the hooks are mainly in the lowermost part of the series. Seen individually, the hooks are distally hooded, have a main fang nearly at right angles to the shaft, and a small distal tooth, best seen when the hook is on its side (Pl. 11, fig. 3). Notopodia throughout have only long, slender, distally pointed setae.

*Spio punctata* shows resemblance to *Spio multioculata* (Rioja) (see Fauvel, 1927, p. 44); in the latter, however, the hooded hooks are distally obtuse, are first present in an earlier segment, and some of the anterior neuropodia have curved acicular spines.

*Spio punctata* is best represented in samples taken in the vicinity of Santa Catalina Island, in depths of about 40 fms. It is associated with other invertebrate animals including *Amphiodia urtica* (Lyman) (ophiuroid), *Leptosynapta albicans* Selenko (holothuroid), polychaete species: *Artacamella hancocki* Hartman, *Glycera americana* Leidy, *Lumbrineris californiensis* Hartman, *Nephtys ferruginea* Hartman, *Sternaspis fossor* Stimpson, *Sthenelanelle uniformis* Moore, *Tharyx tessellata* Hartman, *Pholoë glabra* Hartman, and others.

#### Genus *Nerine* Johnston, 1838

Type *N. foliosa* (Audouin and M. Edwards) 1834

#### *Nerine foliosa occidentalis*, new subspecies

*Nerine foliosa* n.subsp., Hartman, 1955a, pp. 82, 92

*Collections.* Several specimens taken at VELERO IV Stations 2233, 2114 and 4823.

This is a much smaller form than the stem species, individuals measuring less than 50 mm long. The prostomium is truncate in front and acutely pointed at its median position. A caruncle extends posteriorly from the main part of the prostomium, between the palpal bases, where there is a short median antenna. Branchiae are present from the second setigerous segment and continue posteriorly through most of the length of the body. They are fused with the postsetal lobe and have a short free tip.

Hooded hooks are present in both notopodia and neuropodia of posterior segments. A median parapodium has 6 superior long, slender, distally pointed setae, 7 pairs of more inferior setae, each set with an acicular, distally entire, or bifid hooded hook, and a long pointed seta. The corresponding neuropodia have 13 pairs of acicular curved hooded hooks, and an equal number of long, slender capillary setae like those in notopodia but somewhat slenderer. The first three ventralmost setae are the longest; they are directed ventrolaterally.

The subspecies differs from the stem, *Nerine foliosa*, in that neuropodial hooks are first present at about segment 27 instead of 58-60, and notopodial hooks are present at about segment 30, whereas in the stem they occur from segment 60-67. Branchiae are completely bordered by the postsetal lamella in the stem species, whereas they have a short free tip in the subspecies. The hooded hooks are very similar in both forms.

*Nerine foliosa occidentalis* has been taken from silty sediments 1.9 mi west of Newport Beach, 5.4 mi from Point Fermin light, and 16.5 mi from Santa Barbara light, in 11 to 23 fms. It is associated with a diversified polychaete fauna including other spionids, *Laonice cirrata* (Sars), *Prionospio pinnata* Ehlers, *P. malmgreni* Claparède, *Spiophanes bombyx* (Claparède), *S. missionensis* Hartman, *Tharyx tessellata* Hartman and other cirratulids, and numerous other polychaetes numbering 76 species and 600 specimens from a grab sample measuring 0.63 cu ft of gray black sand, in 11 fm, black sand.

Genus *Nerinides* Mesnil, 1896

Type *N. longirostris* (Quatrefages) 1843

*Nerinides maculata*, new species

Plate 12, figs. 1-4

*Collections.* VELERO IV Stations 2624 and 6817, the first off San Felipe, Lower California, the second from Redondo Canyon, California.

This is a small species; total length is about 15 mi; width 0.9 mm; segments number 61. The prostomium is longer than wide, rounded in front (Pl. 12, fig. 1) and has 4 eyes at its posterior end; they are in crescentic arrangement with the anterior pair widest apart, and the posterior eyes located between the palpal bases. A pair of dark pigment patches is present at the frontal bases of the palpi, and a similar pair of spots on the peristomium, in front of the first parapodial segment. The ventral side of the body is pale, has black, paired narrow bars in segmental grooves, mainly between segments 3/4 to about 16/17. On

the dorsum the transverse, ciliated rows are present and conspicuous from the first branchial segment. Interramal or intersegmental pouches have not been observed. The body terminates posteriorly in a pair of thicker, longer ventral cirri and a similar, though slenderer and shorter pair of dorsal cirri, directed obliquely back.

Branchiae are present from the second segment to the end of the body; they are long, slender, straplike and completely free from the postsetal lamella (Pl. 12, fig. 3).

Anterior parapodia are provided with long, slender, pointed setae in both notopodia and neuropodia. One or two longer, thicker setae are usually present at the inferiormost position of the neuropodial fascicle. Hooded hooks are present in neuropodia from the eleventh, and continue posteriorly to the end. A postmedian segment has a notopodium with a long, dorsally directed branchia, an auricular postsetal lamella, and about 12 to 16 slender, distally pointed setae. The corresponding neuropodium has a shorter but deeper postsetal lamella and 3 kinds of setae; the 2 ventralmost are longest, directed ventrally. The others form a transverse series of 9-12 hooded hooks alternating with an equal number of longer, slenderer, pointed setae.

Seen individually, the hooded hooks have a rounded hood, and the main fang is at right angles to the shaft; it is surmounted by 2 small teeth in tandem (Pl. 12, fig. 4). The posterior end terminates in 4 cirri (Pl. 12, fig. 2).

*Nerinides maculata* differs from other species of the genus in the character of its prostomium and adjacent parts; the prostomium is broadly rounded in front, and the maculated spots are at the base of the palpi and posterior end of the peristomium. In a nearly related species, also from southern California (see *N. pigmentata*, below), the maculation is on the prostomium.

*N. maculata* may be considered a southern species, having its distribution limited largely to the southernmost parts of California and western Mexico. The collection from Redondo canyon, southern California (Sta. 6817) came from 40 fm, in sediments of gray sand; it was associated with an unusual number of a mytilid clam, *Amygdalum pallidulum* (Dall) (100+ individuals), together with 28 other species of polychaetes.

*Nerinides pigmentata* (Reish) 1959, new combination

*Spiophanes pigmentata* Reish, 1959, pp. 11-13.

*Collection.* VELERO IV Sta. 5869, and others, from southern California.

As in the preceding species, the prostomium is truncate at its frontal margin. There are 4 eyes in quadrate arrangement, located between the palpal bases. A large, circular dark spot is located on the anterior third of the prostomium. Branchiae, designated dorsal cirri in the original account, are present from the second setigerous segment; they increase in length and width posteriorly, becoming long and straplike, and are present throughout the rest of the body. Notopodia are provided with pointed setae only. Neuropodia have setae in the first 11 segments and hooded hooks from about the twelfth segment. The hooks have a large fang slightly more than right angled to the main shaft; this is surmounted by 3 smaller teeth in tandem, with the distalmost tooth the smallest. In antero-median segments there are 10 to 12 hooks alternating with as many pointed setae; in posteriormost segments the numbers decrease somewhat. The pygidium terminates in one pair of longer, and another of shorter, cirriform processes.

*Nerinides pigmentata* was first described from Newport Bay, California, in silty or mixed sediments; it occurs more widely in shelf depths of southern California, in silts and shelly bottoms. At VELERO IV Sta. 5869 it was associated with 50 species of polychaetes numbering 410 specimens, of which the most numerous were *Onuphis nebulosa* Moore, *Chloeia pinnata* Moore, *Lumbrineris cruzensis* Hartman, *Noto-mastus tenuis* Moore, *Tharyx tessellata* Hartman, *Prionospio malmgreni* Claparède and *P. pinnata* Ehlers.

Genus *Prionospio* Malmgren, 1867

Type *P. steenstrupi* Malmgren, 1867

*Prionospio pygmaeus*, new species

*Collections.* The type is selected from VELERO IV Sta. 2311 (50+, some ovigerous); others are from Stations 2505, 4862, 5531 and from shelf depths of southern California.

This is one of the smallest species of the genus. Total length of ovigerous individuals is 7 to 8 mm; width is 0.3 mm, and number of setigerous segments 46. It is not to be confused with *Prionospio malmgreni* Claparède, with which it may occur (Hartman, 1955a, p. 77). The prostomium is longer than broad, has a straight frontal margin and tapers slightly back to the bases of the palpi, where it narrows to a slender ridge and extends to the second setigerous segment. The peristomium is prolonged forward as a pair of lateral lobes at the sides of

the prostomium, much as in *Prionospio malmgreni* Claparède, and does not form lateral wings as in *P. pinnata* Ehlers. Prostomial eyes are small, reddish, number 4 in trapezoidal arrangement; they are all about equal in size, or the anterior are slightly larger and wider apart, located at the midlength of the prostomium, whereas the posterior smaller ones are located between the palpal bases. There is no median antenna.

The first setigerous segment is biramous, its rami smaller than but similar to those farther back; both notopodia and neuropodia have slender, distally pointed setae. The second segment is larger than the first and carries a pair of smooth, distally tapering branchiae.

Branchiae number 4 pairs; the first 3 pairs, located on setigerous segments 2 to 4, are cirriform, increase in size from the first, and the fourth pair is much larger, pinnately divided and terminates distally in a slender end. Typically the branchiae are held so that the 2 of a pair are directed dorsally or somewhat overlap over the middle.

The postsetal lobe of notopodia is auricular and encompasses the setal fascicle from behind; this lobe increases in size through the ninth segment and is largest between segments 3 and 6; after the twelfth segment it is notably smaller. The corresponding lobes of neuropodia are digitate and taper distally. Parapodia in posterior segments have inconspicuous postsetal lobes.

The posterior end of the body tapers and ends in a constricted pygidial ring provided with a long, median, filiform cirrus and a pair of much shorter, digitate cirri, arranged in a transverse series.

Anterior parapodia have conspicuous fascicles of slender, pointed setae. Between segments 11 to 21, a ventralmost, thick, distally pointed, curved seta is present and directed ventro-laterally. Hooded hooks are present from about the thirteenth neuropodium; at first they occur singly, accompanied by pointed setae; their number increases gradually so that they form transverse series, accompanied by an inferior fascicle of slender, pointed setae. Seen individually, the hooks have a rounded hood, and the shaft terminates in a thick fang, slightly oblique to the shaft, and a small distal tooth at the upper base of the fang.

*Prionospio pygmaeus* was at first confused with *P. malmgreni* (Hartman, 1955a, p. 77) with which it occurs, and from which it is distinguishable by characters visible under moderately high magnification. It is typically less than half as large as *P. malmgreni*; the posterior eyes of the prostomium are never larger than the anterior eyes, and the branchiae of the first pair are cirriform, not pinnately divided.

The type collection (from Sta. 2311) contained in all four species of the genus: *P. pinnata* Ehlers (1), *P. malmgreni* Claparède (10+), *P. cirrifera* Wirén (2), and *P. pygmaeus* (50+). Other species with which it was associated are partly listed in Hartman (1955a, p. 77).

Genus *Boccardia* Carazzi, 1895

Type *B. polybranchia* (Haswell) 1885

*Boccardia basilaria*, new species

Plate 13, figs. 1-7

*Collections.* The type was selected from VELERO IV Sta. 5161; others are from Sta. 4802, and numerous other areas along the shelf of southern California, mainly from Santa Barbara south through the San Pedro area.

This is a large species; total length is 30 to 45 mm; width 3 to 4.5 mm; segments number 100 to 120. The body is depressed in the anterior region, widest near the middle and tapering posteriorly. Branchiae occur on setigerous segments 2, 3 and 4, and from the sixth setigerous segment posteriorly through a long median region; they are absent from about the last 50 segments. Fresh specimens are usually dusky in the anterior region and along parapodial parts.

The prostomium is short and truncate in front where it is medially incised (Pl. 13, fig. 1). There are 4 eyespots in trapezoidal arrangement, the anterior pair the larger and wider apart; the posterior pair is between the palpal bases. The prostomial caruncle extends back as a slender ridge to the end of the third setigerous segment.

The first parapodia are biramous and smaller than those farther back; the notopodium is smaller than the neuropodium. The modified fifth segment is about twice as long as the others and it has biramous fascicles; a notopodial fascicle has two kinds of hooks (Pl. 13, fig. 1), including an anterodorsal series of 3 to 5 larger falcigers (Pl. 13, fig. 5) and 5 to 6 similar embedded ones, alternating with an inferior series of about 6 bristle-topped spines (Pl. 13, fig. 3); the largest ones are at the posterior end of the series and there are 4 or 5 embedded ones. The neuropodial fascicle is small, inconspicuous and provided with a few long pointed slender setae.

Neuropodial hooded hooks are first present in the seventh setigerous segment; they number 7-9 to 12, arranged in a transverse row and are accompanied at the inferior end of the series by a small bundle of

slender capillary setae. The distal end of the hooks is unique in that it appears simply falcate (Pl. 13, fig. 7) surmounted by a rounded hood. Under high magnification a small secondary tooth is visible (Pl. 13, fig. 6) in some hooks.

The body terminates in a constricted pygidial ring (Pl. 13, fig. 2), followed by a semicircular disk with a pair of dark spots at the sides. Pouched glands are present in neuropodia from about the tenth to seventeenth segments.

The tube is U-shaped, loosely constructed and externally covered with silt and muddy debris; internally it is smooth and mucoid. Tubes tend to be massed to form clumps, with the anterior open ends in the same direction.

*Boccardia basilaria* differs from other species of the genus most conspicuously by having hooded hooks that are nearly falcate. The modified spines of the fifth segment are of two kinds; one is falcate, the other is bristle-topped with a constricted neck region below the ornamented region. In this respect it approaches *B. proboscidea* Hartman, inhabiting intertidal zones of California. From the latter, *B. basilaria* is distinguished by its altogether different kind of hooded hooks and pygidial processes.

*B. basilaria* has been found most concentrated in shallow shelf bottoms of the Santa Barbara shelf south to San Pedro area, in depths to 40 fms, in silts and black fine sands, associated with many other kinds of polychaetes. Its known distribution is limited to southern California, in shallow ocean bottoms.

Genus *Polydora* Bosc, 1802

Type *P. cornuta* Bosc, 1802

*Polydora neocardalia*, new species

Plate 14, figs. 1-4

*Collections.* The type is selected from VELERO IV Sta. 2217; others come from Stations 2307, 5502, 5832.

This is a small species; length is 15 to 24 mm, and width 1.5 mm; segments number about 100. The prostomium is broadly bifid at its frontal margin; eyes are weakly developed to absent and number 2 to 4 spots, with a pair on either side between the palpal bases. The nuchal ridge is long and extends back through the fifth to ninth setigerous segments. The paired palpi are long and extend forward for a distance

equal to that of the first 18 segments. The first segment is biramous, with the notopodium smaller than the neuropodium; the former is represented by a digitate cirrus and an inconspicuous setal fascicle; the neuropodium has a broad postsetal lobe and a spreading setal fascicle. Parapodia from the second segment are about twice as large as those from the first and resemble those of more posterior segments.

Branchiae are present from the eighth setigerous segment (Pl. 14, fig. 1), at first small and globular; they increase in length and attain full size within 6 or 7 segments, where they are long, straplike and continued posteriorly through a long region; they are lacking from about the last 30 segments. The posterior end of the body terminates in a collarlike, glistening white lobe with a dorsal notch.

Notopodial setae are of two kinds and all are distally pointed. An anterior vertical series consists of shorter, broadly limbate setae and a posterior vertical series of longer, slenderer ones. These differences are most notable in segments immediately following the modified fifth segment, in which the shorter broader setae are also more inferior (Pl. 14, fig. 4) than the longer, slender ones.

The modified fifth segment is about twice as long as those adjacent to it. It has a dorsal setal fascicle with 6 to 8 distally pointed, geniculate setae, and an inferior fascicle of 8 to 10 pointed setae, somewhat larger and less bent than those of the upper bundle. The thick, modified spines are nearer the dorsal fascicle; they are of a single kind, number about 6 on a side, are yellow, falcate in shape and accompanied by an equal number of slender, lanceolate setae.

Hooded hooks are present from the seventh setigerous segment; at first they are few in a series and number about 4 in a fascicle, accompanied by 2 to 5 inferior pointed setae (Pl. 14, fig. 1). After the twelfth neuropodium the uncinial series is followed by a ventralmost pointed seta, and by the fifteenth the pointed setae are absent. Seen individually, the hooded hook is distally bifid, with the teeth oblique to the shaft; those in anterior (Pl. 14, fig. 3) and posterior (Pl. 14, fig. 2) segments differ little except in decreasing size farther back.

Some individuals are encased in a mucoid tube externally coated with flocculent mud; the tube is nearly straight and friable.

*Polydora neocardalia* resembles *P. cardalia* Berkeley (1927, p. 418) from western Canada. Both have a prostomium incised in front; a long nuchal ridge extends through the pre-modified segments; and the fifth segment has similar superior and inferior fascicles of setae. *P.*

*cardalia* is much larger, measures to 150 mm long and consists of about 400 segments. It also has packets of needle-like spines in posterior parapodia, not found in *P. neocardalia*. The modified spines of the fifth segment are straight and not falcate.

*P. neocardalia* has the same general distribution as *Boccardia basilaria*; the two have usually been taken in the same samples, between Santa Barbara and the San Pedro area from shelf depths.

### *Polydora limicola* Annenkova, 1934

*Polydora ciliata limicola* Annenkova, 1934, p. 325, fig. 5.  
Hartman, 1959, p. 385.

*Collections.* Playa del Rey, near Los Angeles, in intertidal zones, at bases of *Mytilus edulis* colonies (many); Los Angeles harbor, fouling on bottoms of ships (many).

In southern California this species attains a length of 18 to 25 mm, width about 1 mm, and segments number 80 to 90. Most individuals occupy mucoid, mud-covered tubes, massed to form clusters, and externally covered with fine gray silt; these clusters resemble those of *Polydora ligni* Webster, sometimes found in the same habitat.

The prostomium is prolonged forward as a snout and is vaguely to distinctly incised at its middle frontal margin. The 4 eyes are in trapezoidal arrangement, or may be obscure to nearly absent. A nuchal ridge extends back between the palpal bases and continues to the end of the second to fourth setigerous segment; there is no median antenna. Palpi are long, taper distally and tend to remain attached through preservation.

The first setigerous segment has neuropodial fascicles only; the setae are few and inconspicuous. From the second segment parapodia are biramous, with setae well developed in each fascicle. The fifth or modified segment is nearly twice as long as those adjacent; it is provided with modified spines, numbering 8 to 15, arranged in a wide open crescent, in a single row, and they are accompanied by slenderer, distally pointed setae. The falcigerous spines have a small, triangular subterminal tooth on one side, best seen when the seta is viewed from its greatest width. When the falciger is slowly rolled it is seen that the tooth is attached to the spine only at its base, and the distal part is finger-like. This condition contrasts with that in *Polydora websteri* (see below) in which the accessory process is shelflike, not toothlike.

The lower, small fascicle of setae contains only small, distally pointed ones of a single kind.

Hooded neuropodial hooks are first present from the seventh, or second postmodified segment. Seen individually, they have a bifid tip with the main fang slightly acute to the shaft and the distal tooth unusually slender though moderately long.

Color pattern is characteristic in some individuals, or it may be faded. The large palpi are crossed by 4 or 5 bars of black pigment. A similar melanistic pigment surrounds the anterior and lateral margins of the prostomium, and forms paired black spots on the dorsal side of segments 2 to 4.

In southern California *Polydora limicola* is one of the chief fouling species, depositing muddy debris on denuded surfaces. It is associated with other polychaetes, including the following: *Dorvillea articulata* (Hartman), *Halosydna johnsoni* (Darboux), *Nereis mediator* Chamberlin, *Ophiodromus pugettensis* (Johnson), *Polydora ligni* Webster and *Hydroides norvegica* Gunnerus.

*Polydora limicola* was originally described from the Commander Islands in the Arctic region; it was then found very abundant in the upper horizon of the sublittoral zone, covering stones with an unbroken sheath, chiefly in sandy and muddy bottoms. In southern California, it occupies much the same habitat, in intertidal areas, along breakwaters, and on the bottoms of ships.

### *Polydora websteri* Hartman, 1943

#### Plates 16, 17

*Collections.* Newport Bay, California, in intertidal flats, in shells of oysters; Coos Bay, Oregon, in shells of pectens.

Calcareous structures, especially shells of bivalve mollusks, occurring in littoral zones of temperate or warm water seas, are frequently drilled by this spionid. In Newport Bay it is especially abundant in oyster beds, especially of *Ostrea lurida* Carpenter, where it causes U-shaped etchings on the outer surface of the exposed valve (Pl. 16). In Coos Bay it attacks pecten shells (Pl. 17) in the same manner.

This species is best distinguished from nearly related ones by the character of the large spines of the fifth segment. Seen individually, they are falcate, and have a broadly attached flange (not a tooth) on one side, in the region of greatest concavity. These spines number 7 to 9 in a series, and are accompanied by slenderer, distally pointed setae that

tend to become brush-like when pressed down. The posterior pygidial flange is broadly flaring, or only slightly constricted.

Specimens from southern California have been compared with type specimens from eastern United States where it is known to attack the commercial oyster (Pl. 17). The latter are only about  $2/3$  as large; the long palpi have a pair of fine black lines along the edges of the longitudinal grooves. In other respects there is close agreement.

*Polydora websteri* is widely distributed along both shores of the United States, and drills in calcareous structures.

### *Polydora* ? *quadrilobata* Jacobi, 1883

Fauvel, 1927, p. 54, fig. 18.

Annenkova, 1932, p. 139, figs. 6-9.

*Collections.* VELERO IV Sta. 4807 (1 or more) off Point Vicente light, near San Pedro, California, in 9 fms, black mud.

The prostomium is rounded to medially incised, continued back as a flattened lobe between the palpal bases to form a caruncle that extends to the middle of the third setigerous segment; eyes and a median antenna are lacking. Branchiae are present from the seventh segment and continue back on many segments. The first parapodia are biramous, the notopodium smaller than the neuropodium. The first and second neuropodial postsetal lobes are unusually prolonged and digitate; the third one is less so and from the fourth the lobe is foliaceous and not digitate.

Neuropodial hooded hooks are first present from the seventh setigerous segment. The uncini have a main fang slightly more than right-angled to the shaft; the accessory tooth is small.

The modified spines of the fifth segment number 4 or more in an oblique series. Each is distally unequally bifurcated and has a bristly tuft in the concavity.

*Polydora quadrilobata* is known from north Atlantic and Pacific oceans (see Fauvel, 1927, p. 54, and Annenkova, 1932, p. 134).

### Genus *Pseudopolydora* Czerniavsky, 1881

Type *P. antennata* (Claparède) 1870

#### *Pseudopolydora* sp.

*Collection.* VELERO IV Sta. 2307 (1), in the San Pedro region.

The genus may be well represented in southern California, but it is separable from *Polydora* Bosc (see above) in characters of microscopic

size. Hooded hooks are first present from the eighth, instead of seventh, setigerous segment. The modified fifth segment has a double, instead of single, row of modified spines. In the specimen reported, the first setigerous segment is inconspicuous, located dorsolaterally and at the level of the prostomial eyes. Branchiae are first present from the eighth, or first uncinigerous, segment.

Family MAGELONIDAE

Genus *Magelona* Müller, 1858

Type *M. papillicornis* Müller, 1858

*Magelona sacculata*, new species

Plate 18, figs. 1-7

*Magelona* sp. Hartman, 1955a, p. 176.

*Collections.* Hundreds of individuals come from shallow ocean bottoms, chiefly in depths of 20 to 40 meters, off southern California, from Point Conception to south of the Mexican border and in sediments of olive green silt to gray sand. The type is selected from VELERO IV Sta. 2311 on the San Pedro shelf area; others are from the Santa Monica Bay shelf, and adjacent areas to the north and south. The best represented stations (see data in Barnard, Hartman and Jones, 1959) are the following: 4744 with 158 specimens, 4819 (150), 4843 (102), 4842 (100), 5185 (51), 4840 (47), 4758 (47), 4743 (49), 5043 (72), 4844 (56), 4787 (25), 4759 (22) and many others.

Length of a larger individual is 20 to 30 mm; width is 7 mm or less. The body is threadlike and widest in the region of the palpal bases; it tapers posteriorly and consists of 100 or more segments. The prostomium is rounded in front, has a long, triangular median low ridge without lateral horns (Pl. 18, fig. 1) and a pair of weak, transversely ridged, lateral areas. The proboscis, sometimes everted, is a smooth, subspherical pouch. Paired palpi are long, coarsely papillated along the sides and most conspicuously in their distal three fourths; there are no eyes. The posterior end of the body terminates in a broadly rounded anal end with a pair of short, laterally directed processes (Pl. 18, fig. 2).

The first segment is a smooth, broad ring slightly longer than the next, or first parapodial, segment. The next 9 segments are setigerous, and have laterally directed biramous parapodia with foliaceous lobes above and below. The setal fascicles are spreading and have setae of one kind; they are long, slender and taper distally.

The modified ninth segment has mucronated setae of 2 kinds. One is longer, slenderer (Pl. 18, fig. 5), located at the outer ends of notopodial and neuropodial fascicles; another is shorter, broader (Pl. 18, fig. 4) and occurs in spreading series in inner and medial parts of the fascicle; their arrangement is illustrated in Plate 18, fig. 6.

Conspicuous pouched membranes, first present behind the modified ninth segment, occur also between segments 10 and 11, and at irregular intervals in abdominal segments. They are most developed at the sides of the body, between successive parapodial outgrowths (Pl. 18, fig. 1).

Abdominal parapodia have broadly foliaceous, notopodial and neuropodial lobes (Pl. 18, fig. 7) in lateral position, and transverse series of long handled, hooded hooks. Dorsal and ventral cirri are very short and easily overlooked; they are located at the inner bases of the large parapodial lobes. Hooded hooks have a large fang which is nearly at right angles to the shaft, and surmounted by 2 much smaller teeth in a transverse row (Pl. 18, fig. 3). They are best seen by slightly rolling the seta under a cover slip.

Color in life is pale ivory with paired lavender spots on the dorsum, most intense in the anterior region of the body, and usually within and over the parapodial bases.

*Magelona sacculata* differs from other species of the genus (see Hartman, 1944c, p. 319) in having conspicuous lateral pouched membranes; the anterior margin of the prostomium is broadly rounded, and modified mucronate setae of the ninth segment are of two kinds.

This species occurs commonly in southern California, from Point Conception to south of the Mexican border, in depths of 10 to 40 meters, usually in sediments of silt or fine sands.

## Family CIRRATULIDAE

### KEY TO GENERA AND SPECIES

- |  |    |
|--|----|
| 1. Anterior end with a single median antenna . . . . .                                   | 10 |
| 1. Anterior end without a median antenna . . . . .                                       | 2  |
| 2. Some parapodia with composite setae . . . . .   |    |
| . . . . . <i>Acrocirrus crassifilis</i>  |    |
| 2. Composite setae absent . . . . .  | 3  |
| 3. Anterior dorsal side with a pair of long, thick palpi, appearing tentacular . . . . . | 4  |

3. Anterior dorsal side without paired palpi . . . . . 7
4. Simple setae slender and distally pointed . . . . . 11
4. Setae partly acicular spines or hooks . . . . . 5
5. Acicular setae distally excavate or spoon-shaped; body often dark green to black . . . . . 14
5. Acicular setae not excavate . . . . . 6
6. Acicular spines in posterior segments distally entire . . 17
6. Acicular spines in posterior segments distally bifid . . . 21
7. One or more anterior segments with a transverse row of long tentacular cirri or branchiae . . . . . 8
7. Anterior region without long tentacular structures (Pl. 21, fig. 1) . . . . . *Raricirrus maculata*
8. Lateral tentacles first present on first setigerous segment . 16
8. Lateral tentacles first present behind the first setigerous segment . . . . . 9
9. Only one segment with transverse rows of many tentacles . 15
9. Several anterior segments with transverse rows of many tentacles . . . . . *Timarete perbranchiata*
10. Pygidium with 3 slender appendages . . . . . *Cossura candida*
10. Pygidium with many slender appendages . . . . . *Cossura pygodactylata*
11. Forming tessellated mucoid tubes; posterior setae toothed or serrated along cutting edge; body length to 60 mm . . . . . *Tharyx tessellata*
11. Without mucoid tubes; posterior setae not toothed . . . . 12
12. Posterior end more or less inflated; overall size unusually small, length 3 to 6 mm . . . . . *Tharyx monilaris*
12. Posterior end not inflated; body considerably larger . . 13
13. Smaller, length to 15 mm; estuarine . . . . . *Tharyx parvus*
13. Larger, length to 60 mm; in outer areas . . . . . *Tharyx multifilis*
14. Constructing calcareous matrices (Pl. 20, upper) . . . . . *Dodecaceria fewkesi*
14. Penetrating calcareous structures, especially abalone shells . . . . . *Dodecaceria concharum*
15. Posterior parapodia with one or few single black spines in a parapodium . . . . . *Cirriiformia luxuriosa*

15. Posterior parapodia with more numerous, yellow spinelike setae in transverse rows . . . *Cirriformia spirabranca*
16. Neuropodial spines first present from segment 6-11; notopodial spines first present 4 to 6 segments farther back . . .  
. . . . . *Cirratulus cirratus*
16. Neuropodial spines first present from about segment 17-26; notopodial spines first present about 10 segments farther back  
. . . . . *Cirratulus cirratus spectabilis*
16. Neuropodial spines first present from about segment 30-39; notopodial spines first present farther back . . . . .  
. . . . . *Cirratulus cirratus cingulatus*
17. Prostomium with paired transverse rows of eyes, resembling those of *Cirratulus cirratus* . . . *Chaetozone multioculata*
17. Prostomium without eyes in transverse series . . . . . 18
18. Acicular spines present in neuropodia from the first parapodia; prostomium usually with a pair of lateral eyes . . . .  
. . . . . *Chaetozone corona*
18. Acicular spines first present in more posterior segments . . . 19
19. Anterior neuropodial setae of 2 kinds, the one short and limbate, the other unusually prolonged and whiplike . . .  
. . . . . *Chaetozone spinosa*
19. Anterior neuropodial setae without long, whiplike setae . . . 20
20. Notopodial setae nearly all capillary; neuropodial acicular spines distally serrated . . . . . *Chaetozone gracilis*
20. Notopodial setae replaced by spines in posterior segments; neuropodial spines distally simply falcate . . . . .  
. . . . . *Chaetozone setosa*
21. Acicular spines present from first neuropodium and in notopodia from antero-middle region of body . . . . .  
. . . . . *Caulleriella alata*
21. Acicular spines first present behind first segment . . . . . 22
22. Acicular spines first present from about third neuropodium and in notopodium from about sixth to ninth segment . . .  
. . . . . *Caulleriella bioculata*
22. Acicular neuropodial spines first present from median segments and in notopodia from more posterior segments . . .  
. . . . . *Caulleriella hamata*

Genus *Cirratulus* Lamarck, 1801

Type *C. cirratus* (Müller) 1776

*Cirratulus cirratus* (Müller) 1776

*Cirratulus cirratus* Berkeley and Berkeley, 1950, p. 56; Berkeley and Berkeley, 1952a, p. 31.

*Collections.* Most specimens come mainly from northern and central California, from intertidal rocky habitats, usually from muddy crevices, and from eel grass associations; occasional specimens come from sub-intertidal shelf depths of southern California.

Length ranges from 15 to 30 mm. The prostomium has paired transverse series of eyes numbering 3 to 6 on a side. Neuropodial acicular spines are first present behind the sixth, or not before the eleventh segment. Notopodial acicular spines are first present farther back. In posterior segments the neuropodial spines number only one or two in a row and are accompanied by an equal number of slenderer, distally pointed setae; the corresponding notopodial spines are more numerous and much slenderer but otherwise similar to the corresponding ones in ventral series.

*Cirratulus cirratus* is known from world-wide areas in intertidal or shallow depths. It is largely replaced in southern California by cirratulids of other genera.

*Cirratulus cirratus spectabilis* (Kinberg) 1866

*Promenia spectabilis* Kinberg, 1866, pp. 254-255.

*Cirratulus robustus* Johnson, 1901, p. 423, pl. 14, figs. 149, 150.

*Cirratulus spectabilis* Berkeley and Berkeley, 1952a, p. 32.

*Collections.* Numerous individuals come from intertidal areas of northern California to Alaska.

Length is 30 to 45 mm. Median and posterior segments tend to be moniliform because the segments are less crowded than in related species. The prostomium is semicircular, rounded in front, and has paired series of eyespots as in the stem species. Dorsal tentacles are inserted on the first setigerous segment, number 10 or more on a side, and leave a middorsal space that is narrower than the insertion of a set. Lateral branchiae are present from the first setigerous segment, inserted immediately above the notopodial ridge through 15 segments. Thereafter the insertion moves upward to a dorsolateral position, much as in the stem.

Neuropodial spines are first present from about segment 17 to 19, or in larger specimens not before segment 26 to 29; they number about 3 in a series and alternate with longer, pointed setae. Notopodial and neuropodial spines in a segment are about equally thick, with the thickest ones midlateral, and decrease in thickness more distally. This character may distinguish the subspecies from others.

Color in life is dark olive green to almost black; the prostomium is paler and has dark eyespots. The dorsal tentacles are strewn with red spots in irregular rows.

*C. cirratus spectabilis* is distributed in the northeastern Pacific Ocean in littoral zones, seldom south to central California.

### ***Cirratus cirratus cingulatus* Johnson, 1901**

*Cirratus cingulatus* Johnson, 1901, pp. 422-423, pl. 14, figs. 145-148.

*Collections.* Numerous collections come from the northeastern Pacific Ocean, south to central California, from intertidal rocky bottoms.

Length is 50 to 100 mm. In the type specimen neuropodial spines are first present from segment 35 and notopodial spines from segment 45. In others there is some departure from this location but only within limits of less than 10 segments. The prostomium tends to be prolonged forward. In median segments the acicular spines are unaccompanied by slender pointed setae. This subspecies differs from nearly related ones in that the largest acicular spines in a fascicle are located at the distal ends of the two rami, and they decrease in size toward the midlateral line, thus contrasting with the condition in *C. cirratus spectabilis* where they are largest medially and decrease in size at dorsal and ventralmost ends of the fascicle.

*C. cirratus cingulatus* ranges through the northeastern Pacific Ocean, in shallow or littoral depths; it is associated with rocky habitats.

### DISCUSSION OF THE GENERA CAULLERIELLA, CHAETOZONE AND THARYX

Species of these three genera are usually distinguished from one another with difficulty. All have an anterior pair of palpi, usually fallen away from preserved specimens; they originate on the dorsal side in front of, or on the first setigerous segment. Parapodia are reduced to low, papillar mounds and have no characteristic lobes. The only reliable characters concern the microscopic details of setae and spines, especially those from the posteriormost segments of the body.

Species of *Tharyx* are provided only with limbate setae terminating distally in a slender, hairlike tip. Those of *Caulleriella* and *Chaetozone* are acicular in part. It has been practice (Fauvel, 1927, p. 90; Berkeley and Berkeley, 1952a, p. 31) to separate the several species of these genera from one another by the arrangement of these spines. In species of *Caulleriella* they are held in discrete series at the sides of the body throughout the length; in species of *Chaetozone* they form cinctures encircling the body in posterior segments. This character is not reliable, mainly because specimens are frequently taken which are in fragments, have lost the diagnostic posteriormost segments, and then cannot be generically assigned. For this reason a separation is here proposed, recognizing the distal character of the acicular spines; in species of *Caulleriella* they are distally bifid; in those of *Chaetozone* they are distally entire or at least not bifid.

Genus *Caulleriella* Chamberlin, 1919

Type *C. bioculata* (Keferstein) 1862

The buccal region consists of one or two visible achaetous segments. The first setigerous segment has a pair of long palpi, sometimes accompanied by a pair of lateral tentacles (=branchiae). Bifid acicular setae or spines are present in neuropodia and some notopodia but may be absent in the latter.

*Caulleriella* differs from the nearly related *Chaetozone* (see below) chiefly in that species of the latter have spines distally entire or at least not bifid. It differs from the nearly related *Tharyx* in that the latter has all setae limbate and distally pointed. In species such as *Chaetozone zetlandica* McIntosh (see Fauvel, 1927, p. 99) where acicular spines are limited to posterior neuropodia, the generic status is uncertain without complete specimens.

*Caulleriella hamata* (Hartman) 1948, new combination

*Tharyx hamatus* Hartman, 1948, pp. 37-38, fig. 10.

*Collections.* Numerous individuals were taken in California, from Point Conception south to San Diego, in quantitative samples, from sediments of silt and mixed bottoms, in shelf depths.

Length is 12 to 15 mm. The prostomium is acutely pointed in front and usually has a pair of eyespots located at the sides. Only slender capillary setae occur in anterior segments. Acicular spines are first

present from near the middle of the body, at neuropodium 17 or later; they begin gradually as 2 bifid spines alternating with 3 slender, pointed setae. The corresponding notopodia have 5 or 6 capillary setae. This arrangement is continued posteriorly through about 30 segments. In the posterior fifth of the body the notopodium has one acicular spine, accompanied by 3 distally pointed setae, and within 2 or a few segments there are 2 such spines, resembling those in neuropodia. The ventral spines increase to 6-8 in a transverse series, and in far posterior segments the number of spines in notopodia and neuropodia is about the same. They occur in discrete fascicles and never form cinctures about the body. The posterior end of the body terminates in a depressed anal flange as long as the last 2 or 3 segments of the body.

*Caulleriella hamata* was first described from Alitak Bay, Alaska; it has been found in southern California, in sediments of silt and shelly debris at shelf depths. It may occur more widely throughout the north-eastern Pacific Ocean, in subintertidal depths.

### *Caulleriella alata* (Southern) 1914

*Chaetozone alata* Southern, 1914, pp. 112-113, pl. 12, fig. 27.

*Caulleriella viridis pacifica* Berkeley, 1929a, p. 307.

*Caulleriella alata* Berkeley and Berkeley, 1950, p. 57; Berkeley and Berkeley, 1952b, p. 36, fig. 64.

*Collections.* Southern California, in mixed sediments at shelf depths (many).

Length is 15 to 20 mm. The prostomium is acutely pointed in front and has a pair of dark, deeply embedded eyes at the sides. All neuropodia have acicular spines that are distally bifid; in anteriormost segments they are accompanied by a few very slender capillary setae; farther back they gradually thicken and the accessory slender setae are frequently absent. Notopodia of anterior segments have only capillary setae. At about segment 20 one or two acicular spines are present with the slender setae; they gradually increase in number and thickness to resemble the spines in neuropodia.

*Caulleriella alata* was first described from Ireland (Southern, 1914) and has since been reported from western Canada south to southern California (Berkeley and Berkeley, 1952a, p. 36). Based on finds from quantitative samples from southern California, it is abundant only in shallow sublittoral seabottoms.

Genus *Chaetozone* Malmgren, 1867Type *C. setosa* Malmgren, 1867

This genus differs from *Caulleriella* (see above) chiefly in that setal spines are distally entire instead of bifid. These spines may form cinctures about the segments in the far posterior region of the body.

*Chaetozone setosa* Malmgren, 1867

*Chaetozone setosa* Fauvel, 1927, p. 101, fig. 35.

*Collections.* Many individuals come from Tomales Bay, California, in intertidal areas, to southern California in shelf depths.

Length of the body is 10 to 25 mm. The prostomium is conical, longer than wider, directed forward, and lacks eyespots. The buccal region is smooth and about as long as the prostomium. Paired palpi are inserted dorsolaterally, on the first visible segment behind the buccal region. The one after that has a pair of lateral branchiae inserted slightly lateral to the palpal insertion, and the next one has biramous parapodia with fascicles of long, slender, distally pointed setae. The setae in notopodia are larger than those in neuropodia, and all are directed laterally.

Lateral branchiae are irregular in occurrence but present on some segments throughout the body; their insertion is immediately above the notopodial ridge. All anterior and median parapodia have only long, slender and distally pointed setae. At about segment 79 to 90, or near the middle region of the body, the first yellow acicular spines are present in neuropodia; at first they number only one or two, accompanied by setae. Farther back they form transverse series of 7 to 9 in a row and alternate with capillary setae. Notopodial acicular spines are first present at about segment 80 to 100 and number 4 to 6 in a series farther back; they resemble those in neuropodia. The posterior end of the body tapers to a blunt end with a terminal pore and a short ventral lobe; the last few segments are not inflated.

*Chaetozone setosa* is known from Atlantic and Pacific oceans, in littoral zones and associated with silty sediments.

*Chaetozone corona* Berkeley and Berkeley, 1941

*Chaetozone spinosa corona* Berkeley and Berkeley, 1941, pp. 45-46.

*Collections.* Hundreds of individuals have been taken in quantitative samples from southern California, mainly in shelf depths. Greatest concentrations were at VELERO IV Stations 4759, 4822, 4869, 5043, 5161, 5539, 5740, with more than 50 specimens in some samples.

Length is 18-25 mm. The prostomium is acutely pointed in front and has a pair of transversely elongated eyes at the side, usually persisting through preservative. The body is pale to white, thickest in its anterior third, and tapering posteriorly. Yellow acicular neuropodial spines are present from the first parapodium; they number about 3 in a ramus and are accompanied by 4 or 5 capillary setae in alternating transverse series. Anterior notopodia have capillary setae, and spines are present from about the ninth setiger, accompanied by slender setae.

Lateral branchiae are inserted immediately above the notopodial ridge in all parts of the body. In posterior segments the space separating notopodia and neuropodia is reduced and the spines form cinctures about the body. The spines are longest at the upper end of the series and decrease in length ventrally.

*Chaetozone corona* in southern California is best represented in shelf depths, and in silty sediments.

### ***Chaetozone multioculata*, new species**

*Collection.* VELERO IV Sta. 5400, 4.2 mi from Santa Barbara Point, California, in 20½ fms, green mud (2).

Length, posteriorly nearly complete, is 10 mm; width at the widest part is 0.8 mm; number of segments is perhaps not more than 30. The prostomium is depressed, equitriangular in shape and has on either side a transverse series of eyespots, separated middorsally by a narrow space; the prostomium grossly resembles that of *Cirratulus cirratus* (see above). The first 3 segments (buccal region) are long and cylindrical, with their total length nearly twice that of the prostomial length. They are followed by the palpal segment, in which the scars of attachment are visible at dorsolateral positions. The next 9 segments are much shorter and somewhat broader; they have lateral biramous parapodia in which both notopodia and neuropodia are provided with fascicles of slender, long, distally pointed setae.

From the tenth setigerous segment the body is tapering, the segments are longer and somewhat moniliform. Yellow, acicular spines are first present in neuropodia from the tenth setigerous segment; they alternate with slender pointed setae. Postmedian segments have 2 or 3 thick, yellow spines and the corresponding notopodia have similar, though slenderer spines, alternating with pointed setae.

Lateral branchiae arise from the dorsal edge of notopodia and are present on some segments throughout the body. Seen individually, the

acicular spines are distally falcate and slightly curved in their distal half.

*Chaetozone multioculata* differs from other species of the genus in having transverse rows of eyes on the prostomium; the body consists of fewer segments and the buccal region is prolonged.

It is associated with an echiuroid, *Listriolobus pelodes* Fisher, and many (32 species) other polychaetes including *Hesperonoë laevis* (see above), *Ceratocephala crosslandi americana* Hartman and *Marphysa disjuncta* (see above). It was taken only from the Ventura shelf, California, in 20½ fms, from green mud sediments.

### *Chaetozone gracilis* (Moore) 1923

*Caulleriella gracilis* Berkeley and Berkeley, 1952a, p. 37.  
Hartman, 1959b, p. 401.

*Collections.* Many stations of the VELERO IV, from southern California, in shelf and slope depths.

Length of mature individuals is 30 mm or less; width about 1 mm; segments number about 110. The body is slender, barrel-shaped between segments 10 to 40, then slenderer, and tapers thereafter. Anterior segments are most crowded, and in middle through posterior segments they are longer, and three to three and a half times as wide as long. The prostomium is acutely pointed in front and lacks eyespots. Palpi, on the first setigerous segment, are inserted above and in front of the first notopodia; they are longitudinally grooved and usually coiled.

Lateral branchiae are inserted immediately above and slightly behind the notopodial mound; they usually occur on most segments but sometimes the first one and last 20 segments lack them. Notopodial setae are slender and capillary through most of the body; a far posterior region may have 2 or 3 thicker, acicular spines in a ramus, accompanied by capillary setae. Neuropodia have transverse series of 7 to 12 dark, thicker, shorter setae alternating with blunt, acicular spines, present from segment 35 to 40, and continued back to the posterior end. These spines are unique in that the distal end is delicately serrated, with 3 distal striations resembling compressed teeth, and the shaft tends to be fuscus.

The body terminates posteriorly in a small, triangular lobe behind the anal aperture. Some specimens are encased in spirally twisted thin tubes (Sta. 4820) not much thicker than the diameter of the occupant, suggesting that a tube may be constructed at maturity.

*Chaetozone gracilis* is most clearly distinguished from other species of the genus in that it nearly lacks notopodial acicular spines, and neuropodial spines are falcate, with the distal tip delicately serrated.

*C. gracilis* was first described from abyssal mud off Santa Catalina Island; it has since been found in slope depths of southern California and western Canada (Berkeley and Berkeley, 1952a, p. 37).

Genus *Tharyx* Webster and Benedict, 1887

Type *T. acutus* Webster and Benedict, 1887

Species of this genus are among those most frequently encountered in southern California in shelf depths. At least 5 species are known to be present, and others may be expected. Their specificity is sometimes obscured because of the lack of strong morphological characters. Immature individuals are most difficult to determine specifically. Color markings, sometimes present in adult individuals, are largely lacking from juveniles or specimens preserved in alcohol. The species named herein are briefly diagnosed in the key (see above).

### *Tharyx multifilis* Moore, 1909

*Tharyx multifilis* Moore, 1909a, pp. 267-268, pl. 9, fig. 43.

*Collections.* Southern California, from intertidal and shallow depths, in silty and mixed sediments.

Length is 50 to 60 mm, segments number 200 or more. The body is large and robust; it tapers posteriorly to a slender pygidium and is not inflated in its last few segments. The prostomium is a short, anteriorly depressed lobe without eyes and with a midventral, longitudinal groove. The buccal region is large, appears inflated, and has only partial furrows marking the segmental lines. All segments are short, uniannular, and not unusual. Setae in both notopodia and neuropodia are slender and capillary, with those of the upper branch the longer but otherwise the same as the neuropodial setae. Lateral branchiae are long, filamentous, inserted immediately above the notopodium in all regions of the body except that they seem to be lacking in many of the posterior segments.

*Tharyx multifilis* was first described from intertidal regions of southern California. It has since been found to attain its greatest abundance in southern California, off the Los Angeles breakwater, in silty sediments.

### *Tharyx parvus* Berkeley, 1929

*Tharyx multifilis parvus* Berkeley, 1929a, p. 307.

*Tharyx parvus* Hartman, 1954a, p. 11.

*Collections.* San Francisco Bay, California, in intertidal mud flats (many).

Length 10 to 15 mm. Color in life is dark reddish brown with the cardiac body visible as a very dark brown body in the middle two thirds of the length of the body. The prostomium lacks eyespots. Lateral branchiae emerge from the body at the upper end of the notopodial ridge. Setae are entirely capillary, with the notopodial setae somewhat longer than the neuropodial ones.

*Tharyx parvus* is known from western Canada south to California, and is well represented in San Francisco Bay, where it occupies vertical burrows in mud flats.

### *Tharyx tessellata* Hartman, 1960

*Tharyx tessellata* Hartman, 1960a, pp. 126-127, pl. 11, figs. 1-4.

*Collections.* Southern California, in subintertidal depths to basin levels (Hartman, 1960a).

Length is 40 to 55 mm. The body is broadest in its anterior third and ends posteriorly in an inflated end. When mature a tessellated tube envelops the body, which becomes reddish purple in color.

It has been found common in southern California, in shelf and slope to basin depths.

### *Tharyx monilaris* Hartman, 1960

*Tharyx monilaris* Hartman, 1960a, pp. 127-128, pl. 12, figs. 1, 2.

*Collections.* Southern California, in shelf to basin depths (many).

This is an unusually small form, measuring only 3 to 6 mm long. It is very slender throughout most of its length except that the anterior region and the prepygidial segments are inflated, much as in *Tharyx tessellata* (above). When mature the middle and posterior segments are moniliform, with gonadal products maturing from behind and segments probably shed as ova ripen. There is no investing tube such as is characteristic of *T. tessellata*.

*Tharyx monilaris* is common in southern California, in subintertidal to basin depths, in silty and mixed sediments.

Genus *Raricirrus*, new genusType *R. maculata*, new species

The prostomium is a simple, semicircular lobe followed by two buccal segments lacking parapodia. The following 9 segments have biramous parapodia and paired lateral branchiae. The next 3 segments are without branchiae. Segment 13 has a pair of short processes (possibly elongated nephridia), followed by 10 or more segments without lateral branchiae. The body terminates in a simple pygidium with dorsal anal pore.

All parapodia are biramous and each is represented by a low papilla provided with simple setae. Notopodial setae are entirely slender and capillary; neuropodial setae are falcigerous. This genus differs from other genera of the family in lacking paired palpi and dorsal tentacles; branchiae are limited to a few pairs on median segments.

*Raricirrus maculata*, new species

Plate 21, figs. 1-3.

*Collections.* VELERO IV Sta. 5027, 1.9 mi from Point Fermin light, California, in 38 fms, medium green black silty sand (6). Sta. 5096, 2.5 mi from same place, in 25 fms, same kind of sediment (51).

The body is flesh colored and has dark pigment in an irregular pattern. Total length is 7 to 10 mm; setigerous segments number about 22. The prostomium is a small, simple lobe without eyes but with a pair of nuchal slits, best seen in lateral view. The next 2 segments are slightly longer and comprise the buccal region. The following 9 segments are cylindrical, have paired biramous parapodia with short to long (Pl. 21, fig. 1) lateral branchiae. Segments 10 to 12 are larger and broader, characterized by containing ovigerous products and covered with a thin epithelium. The thirteenth segment has a pair of short cirri (perhaps nephridial) originating behind the notopodial papilla. This segment is followed by a broadly depressed posterior tail with segments much broader than long, and the posterior end terminates in a small triangular pygidium with dorsal anal pore.

Lateral branchiae vary considerably in length; at their greatest development they are as long as the body and marked with dark pigment patches in irregular arrangement. Preserved, they are wrinkled as though capable of considerable extension. On some individuals they are much shorter, reduced to mere stubs, suggesting that they may be regenerated. They originate immediately behind the notopodial lobe or slightly above it, and near the posterior half of the segment.

Setae are entirely simple and of two kinds. Notopodial setae are capillary (Pl. 21, fig. 2), occur in fascicles of 15 to 20, and extend laterally far beyond the ventral setae. Neuropodial setae are entirely simple and falcigerous (Pl. 21, fig. 2); they number about as many as the corresponding dorsal setae or somewhat fewer. They terminate distally in a recurved smooth fang and have delicate serrations along the cutting edge.

*Raricirrus maculata* is an unusually small species and may well be overlooked in large collections of many kinds of polychaetes. It was first recognized as a distinct species in a sample from the San Pedro shelf, where it was associated with a richly diversified polychaeta fauna, in a grab sample measuring 51.5 liters of sediments; this sample lacked echinoderms, had few if any ostracods, and mollusks were represented only by a few individuals of *Lima* sp. The largest animals were a red nemertean, *Cerebratulus* sp., a seawhip, *Stylatula* sp. and *Panthalis pacifica* Treadwell. Other polychaetes numbered 64 species and nearly 2000 specimens. Most abundant species were *Tharyx multifilis* Moore, *Spiophanes missionensis* Hartman, *Mediomastus californiensis* Hartman, *Paraonis gracilis* Tauber, *Onuphis parva* Moore, *Cossura candida* Hartman, and some other spionids.

### Family FLABELLIGERIDAE

The body is long, tapers posteriorly, and the anterior end usually has a cephalic cage directed forward and concealing the prostomium. The surface epithelium is either enclosed in a translucent, nearly glass-clear mucus, or closely papillated with papillae of one to several kinds; they may be so thickly coated with sand or mud as to completely conceal the body within. Parapodia are biramous with the setal fascicles widely separated but with notopodial and neuropodial lobes inconspicuous or hardly visible, to large and conspicuous (Pl. 23, fig. 4). Most setae are transversely barred internally. Notopodial setae are simple, slender, distally pointed and more numerous than those in the ventral ramus. Neuropodial setae are thicker, shorter, number only one or few in a fascicle; they are distally entire or bifid, and simple or composite.

The prostomium is a small, conical lobe seldom seen except by dissection. Two pairs of large, lenticulated eyes occupy most of the prostomial surface, which is surmounted by a large, semicircular membrane to which the oral tentacles are attached. In *Piromis* this membrane is medially prolonged as a tongue, and in *Coppingeria* it occurs as a pair

of long lobes. The mouth is a large, broad slit below and behind the prostomium. A pair of thick, longitudinally grooved palpi is inserted ventrolateral to the mouth. The palpi are extremely extensile and may be prolonged to five times the contracted length. The alimentary tract consists of a slender esophageal tube, followed by a large secretory sac, and this by the voluminous, brick-red stomach. At its posterior end the stomach is abruptly narrowed to the alimentary tract, which is looped and continues posteriorly to a terminal anus. A single pair of large, yellow, U-shaped nephridia occupies much of the coelomic space in the thoracic region; each opens externally in a small papilla located one on either side of the first segment. Tubes are not known to be constructed.

The family is known for only nine genera of which five are to be found in California. The other four genera are limited either to single records from widely spaced geographic areas, or to restricted seas (see Hartman, 1959b, pp. 413-423). These five genera are recognized for 14 species, distributed in shallow intertidal seas to deep, basin depths off southern California. Another nearly related pelagic form is *Poecobius meseres* Heath, which is more fully discussed elsewhere (Hartman, 1955b, p. 52).

### Genus *Flabelligera* Sars, 1829

#### Type *F. affinis* Sars, 1829

By definition the body is encased in mucus which is translucent, glass-clear, and does not become covered with sand or mud. The epithelial papillae are completely covered by the sheath and the setae are covered except for their distal ends. Notopodial and neuropodial setae of the first segment are longest and directed forward to form a cephalic cage. Farther back the notopodial setae are similar to those of the first segment. Neuropodial setae from the second segment are falcigerous, composite, and usually number one or few in a parapodium. The prostomium is a small lobe surmounted by many oral tentacles.

Only one of the 3 species named below fully agrees with this diagnosis. *Flabelligera infundibularis* (Johnson) is encased in a thick, clear mucus sheath. *F. commensalis* and *F. essenbergae* differ in that they are not encased in a mucus sheath, and the neuropodial falcigerous setae are not clearly composite. They are retained in *Flabelligera* because they agree in other respects.

**Flabelligera commensalis** Moore, 1909

## Frontispiece

*Flabelligera commensalis* Moore, 1909a, pp. 286-288, pl. 9, figs. 62, 63.  
*Flabelligera haerens* Chamberlin, 1919, p. 16.

*Collections.* Southern California, in intertidal rocky areas (many); in shelf depths associated with *Chaetopterus variopedatus* (many).

This beautiful bristle-cage worm is sometimes to be found on the surface of the common purple urchin, *Strongylocentrotus purpuratus* (Stimpson) where it takes on the color of the host species. Length in life is 20 to 45 mm. There is no mucus sheath covering the body. Colors in life were noted by Anker Petersen, who also prepared the colored plate:

Everted head light buff; sides of body lightly touched with reddish purple; under side of body dull orange-yellow with faint tinge of green. Alimentary tract showing through body wall is bright orange to brick red; this is followed posteriorly by an undertone of yellowish green.

Immature specimens, or those not associated with urchins, are grayish or brownish with an undertone of green, due to the color of the blood; larger individuals tend to be flecked with purple, or red. The oral tentacles are of a single kind, all slender and filiform; they number 50 or more on a side and are inserted on a rounded membrane above the prostomial lobe. This membrane is medially prolonged as a slender, smooth tongue. Each tentacle is cylindrical, has transverse rows of cilia and may be capable of considerable movement. In specimens from urchins, the tentacles are purple, the same color as the body. The paired palpi are pale to nearly white, thick, inserted at the sides and below the prostomium. The prostomium is a small, conical lobe with 4 very large eyes in trapezoidal arrangement; they cover most of the prostomial surface.

The surface of the body is closely covered with short papillae. Similar, but longer papillae cover the parapodial lobes; they have a slender stalk and terminate distally in an elongate inflated lobe.

Neuropodia are ventrolateral in anterior and median segments, and ventral in posterior segments. They are provided with single dark, distally curved composite hooks. Each pair has the curved ends directed medially. Notopodia have fascicles of slender setae; they are pale yellow in color and less easily seen than the falcigers because they are largely concealed by the long parapodial papillae. *Flabelligera haerens* Chamberlin (1919) from kelp holdfasts, refers to the free-living stage of *F. commensalis*.

*Flabelligera commensalis* has been found most concentrated in a few areas. On the Palos Verdes peninsula, near Los Angeles, it occurs among the spines of the purple urchin, chiefly at a  $-1.0$  tidal level, especially in rocky bottoms. At higher tidal levels the urchins are present but lack the cage-worms. Off the Palos Verdes slope, in depths of 30-50 ft, *F. commensalis* is very abundant in association with *Chaetopterus vario-pedatus* and many other kinds of polychaetes but no urchins. The species is known only from southern California.

***Flabelligera essenbergae*, new name**

Plate 22, figs. 1, 2; plate 23, figs. 1-4

*Stylarioides papillosa* Essenberg, 1922, pp. 379-381, figs. 1-8.

*Flabelligera papillosa* Hartman, 1959b, p. 416.

*Collections.* Sta. 904-38 (1) Laguna Beach, shore, at extreme low tide line; Sta. 1443-41 (2) at Arch Rock, Corona del Mar, rocky shore in eel grass bed, at  $-1.5$  low tide line.

The specific name is preoccupied (Hartman, 1959b, p. 416) and here replaced with one in honor of the first describer. This unusually modified bristle-cage worm is previously known only through an original find from San Diego. The newly reported collections are also from intertidal zones not far from the type locality. The apparent rarity of this species in shore collections is believed to result from its inconspicuous color and sluggish habit.

Length of the body is 30 to 70 mm, width 5 to 10 mm. Color in life and preserved is slatey gray. The body is widest at its anterior third and tapers posteriorly to a slender end; the forward end is truncate. The body is somewhat depressed with the dorsum convex and the ventrum flat (Pl. 23, fig. 4). Setigerous segments number 28 to 32 in smaller, and to 40 segments in larger individuals. There is no investing mucous sheath.

The body is completely covered with larger papillae on the dorsum (Pl. 22, fig. 1) and smaller ones on the ventrum (Pl. 22, fig. 2). Those medial to the neuropodial bases are uniformly small and continued across the midventrum. All are closely encrusted with sand particles which cannot be removed without destroying the papillae. The lateral notopodia resemble the largest papillae (Pl. 23, fig. 4) but are laterally prolonged, tube-like epithelial investments through which the notopodial armature (setae and papillae) can be extended.

The prostomium is a small, inconspicuous lobe with 4 large eyes. It is surrounded by a tentacular membrane with 50 or more oral tentacles, all similarly long and filiform. The paired palpi are much thicker, slightly shorter, inserted ventrolateral to the oral slit, and held side by side (Pl. 22, fig. 2) in contracted condition; they are probably capable of great extension in life. The cephalic cage surrounds the anterior end like a collar directed forward.

The setae of the first segment are numerous and continued as a collar about the anterior end. They comprise the notopodial and neuropodial setae in linear series; all are of one kind, long, slender, hairlike and internally crossed by striae. From the second segment the notopodial setae are in discrete fascicles and shorter, directed laterally. Seen individually (Pl. 23, fig. 2) they are crossed by striae. Neuropodia from the second segment are ventral in position and provided with one or seldom two large, falcigerous hooks in a fascicle; they are accompanied by 3 to 5 very slender, inconspicuous, distally pointed companion setae (Pl. 23, fig. 1); the latter are uniformly slender along the shaft and taper abruptly to slenderer tips in their free portion. Seen individually, the hooks are sharply recurved at the tip and dark brown to nearly black, whereas the shaft is translucent. The articulation is incomplete, best seen on the convex side (Pl. 23, fig. 1). The embedded shaft is internally cross-striated, and the region beyond the articulation is obliquely striated on its surface.

Epithelial papillae are of 2 or more kinds. Those of notopodia are most easily seen. They can be dissected out of the enveloping notopodial sheath, along with the notopodial setae and investing membranes (Pl. 23, fig. 3). The most conspicuous are very large, long-stemmed, balloon-like structures attached to a long, slender filament; they range from large, long-stemmed, to much smaller, short-stemmed. Seen under high magnification the stalk can be seen penetrated by a canal extending to the inflated base; the balloon is entirely canopied by large pavement cells, whereas the inner space is clear and watery. The 2 largest of these structures are usually seen emerging from upper and lower ends of the notopodial sheath (Pl. 23, fig. 4), and the smallest are near the base of the notopodium. They are believed to be continuously developing, increasing in size and length as shown in the figure.

The other kind of notopodial papillae is slender, bottle-shaped, all of similar size but with shorter to longer stalks. They are in dispersed arrangement about the notopodial base and among the balloon-like

papillae. Seen under high magnification they are distally globular, subapically constricted and then spindle-shaped to the long, slender stalk. They are longitudinally penetrated by a canal and have a distal pore. There is an opaque mass of cells in the thickest region. These papillae have the appearance of mucus-secreting cells.

The functions of these 2 kinds of papillae appear to be totally unlike. The large, balloonlike structures obviously explode outward when they have attained their maximum size. This is demonstrated by the large number of long filaments around the parapodial base, representing the stalks of exploded balloons. It is here suggested that these papillae are excretory in function, and thus may have their contact with the coelomic space. This is all the more probable because this species, like other members of the family, possesses a single nephridial pair, located at the extreme anterior end of the body (Schlieper, 1927, p. 370). Most of the surface of the body is thickly encrusted with sand, resembles an arenaceous armature, whereas the epithelium about the bases of notopodia is thin-walled and protected from impact with the exterior by the investing sheath.

*Flabelligera essenbergae* departs from the genotype in lacking a mucoid investing sheath, and neuropodial falcigers are incompletely, instead of completely, articulated. It agrees in that the setae of the first segment form a cephalic cage, and the neuropodia from the second segment are falcigerous, somewhat composite. Epithelial papillae are of two distinctly different kinds, and the prostomium is surrounded by a tentacular membrane with many tentacles of a single kind.

The species is known only from southern California in low, intertidal zones.

Genus *Pherusa* Oken, 1807

Type *P. plumosa* (Müller) 1776

*Pherusa papillata* (Johnson) 1901

Plate 24, figs. 1-7

*Trophonia papillata* Johnson, 1901, p. 416, pl. 12, figs. 122, 123.

*Stylarioides papillata* Berkeley and Berkeley, 1952a, pp. 8-9, fig. 6.

*Collections.* Many specimens come from Alaska south to California, in intertidal to shelf depths.

Length is about 50 mm; number of segments 72. The surface epithelium is papillate, with individual papillae widely separated (Pl. 24, fig. 1). The anterior end of the body is broadest behind the cephalic cage.

The oral apparatus consists of a pair of thick, longitudinally grooved palpi, inserted at the sides of the prostomium, and 4 pairs of branchiae, inserted in a semicircle about the upper base of the prostomium (Pl. 24, fig. 2). The prostomium is a small papillar mound, provided with 4 large eyes in quadrate arrangement (Pl. 24, fig. 3).

The cephalic cage is formed by the setae of the first 3 segments directed forward. The annulated structure of one from the first segment is shown in Pl. 24, fig. 7 for the base, the middle region, and near the tip.

Falcigerous neuropodial hooks are first present in the fourth setigerous segment. Typically they number 2 or 3 in a parapodium. They vary from slenderer (Pl. 24, fig. 6) to somewhat thicker (Pl. 24, fig. 4). The companion setae from the same segment are distally straight (Pl. 24, fig. 5). Nephridial pores occur on the fifth and sixth setigerous segments, located at the anterior end of the segment, just within the neuropodial base.

*Pherusa papillata* occurs commonly from Alaska to southern California, in littoral zones. In the southern end of its range it is largely replaced by *Pherusa neopapillata* (see below).

### *Pherusa neopapillata*, new species

Plate 25, figs. 1, 2; plate 26, figs. 1-7

*Collections.* The type is selected from VELERO IV Sta. 1205, other types from 1136 and 5102; many other specimens come from shelf depths of southern California.

This species is somewhat smaller than *Pherusa papillata* (see above); adult specimens measure 40 mm long for 43 setigerous segments, or 45 mm long for 54 segments. The body is uniformly and closely papillated (Pl. 25, fig. 1), most intensely on the dorsal and less so on the ventral side. The papillae are elongate, taper distally, but with the attached silt they appear oval to globular, and account for a densely papillated epithelium.

In its prostomial parts and oral tentacles, this species resembles *P. papillata* (above). The paired palpi are large and thicker than the tentacles; they are attached at the sides of the prostomium (Pl. 26, fig. 1). The tentacles or branchiae number 4 pairs and are inserted in a semicircle above the prostomium; usually 2 additional smaller lobes on a side are visible (Pl. 26, fig. 2). The prostomium is a small elevated lobe and has 4 eyes in quadrate arrangement.

Setae of the first 3 segments are long, pointed and form a cephalic cage (Pl. 26, fig. 7). Seen individually, these setae are cross-barred with individual bars longer than wide. Simple yellow falcigerous hooks (Pl. 26, figs. 3, 4) are present from the fourth neuropodium; they number about 4 in a neuropodium, and those in the superior part of the fascicle are the largest; they decrease in size farther down. Posterior neuropodia may have only 2 hooks in a fascicle. The relations of the hooks in a single fascicle are shown in Pl. 25, fig. 2.

*Pherusa neopapillata* is related to *P. papillata* from which it differs in having its surface epithelium more densely papillated; the cross striations of cephalic setae are wider apart, and the overall size is usually less. It has been found most abundantly represented in southern California, in shelf depths, in sediments of silt and mixed debris.

Genus *Piromis* Kinberg, 1867

Type *P. arenosus* Kinberg, 1867

Species of this genus grossly resemble those of *Pherusa* (see above). The eversible oral process consists of a median, tongue-like membrane on which the oral tentacles are inserted. This may be a modification resulting from a forward prolongment of the tentacular basement membrane. In the type species the oral tentacles (sometimes called branchiae) are numerous; this may be a character of generic significance. Setae of the first several segments are longer than others and directed forward to form a cephalic cage. Notopodial setae are entire, slender and transversely barred. Neuropodial setae are simple, distally bifid (Pl. 27, figs. a-c) or falcigerous and entire.

*Semiodera* Chamberlin, 1919, with type *S. cariboa* (Grube) (see Hartman, 1959b, p. 419) is believed congeneric. The incompletely known *Zorus* Webster and Benedict, 1887, with type *Z. sarsi* Webster and Benedict, may also belong to *Piromis* because it was described as having tentacles arising from a protrusible cylindrical stalk and setae were named as only capillary (Webster and Benedict, 1887, p. 730).

As here understood, *Piromis* Kinberg includes at least the following species:

*P. arenosus* Kinberg, 1867, from South Africa.<sup>1</sup> See Pl. 27, figs. a-c.

*P. congoensis* (Grube) 1878, from Congo, West Africa.

*P. americana* (Monro) 1928, new comb., from Taboga, Panama. See below.

<sup>1</sup>I am indebted to Professor J. H. Day of the University of South Africa for the specimen from which the plate was prepared.

*P. capensis* (McIntosh) 1885, new comb., from South Africa. (Earlier as *Semiodera*).

*P. roberti* (Hartman) 1951, new comb., from the Gulf of Mexico. See Pl. 28, figs. 1-4. (Earlier as *Semiodera*).

*P. gracilis*, new species. See below.

*Stylarioides bifidus* Fauvel, 1932, from the Arabian Sea, departs from the species named above in that it has paired, instead of a single, prolonged oral process.

### *Piromis americana* (Monro) 1928, new combination

*Stylarioides capensis americana* Monro, 1928, pp. 96-97, fig. 16.

*Collection.* Half Moon Bay, San Mateo County, California, in 18 fms, rocky bottom.

This species measures about 90 mm long and 6 mm wide. The epithelium is thickly encrusted with sand. The palpi are longer than the prolonged tentacular base. Setae of the first 3 segments form a cephalic cage and are directed forward. Neuropodial hooks are distally falcigerous and entire.

It is known from tropical waters of the eastern Pacific Ocean (Monro, 1928) and central California, in shallow ocean bottoms.

### *Piromis gracilis*, new species

Plate 29, figs. 1-4, plate 30, figs. 1-9

*Collections.* Velero III Stations 216-34 (1), 767-38 (1), 930-39, (3).

A complete specimen measures 230 mm long and consists of 106 segments. The surface papillae are long and filamentous in the region about the parapodia (Pl. 29, figs. 3, 4). Similar papillae occur in irregular longitudinal rows on the dorsal and ventral surfaces. In anterior segments the space between parapodial rami is largely without papillae (Pl. 29, fig. 1); in median and posterior segments the surface is lightly papillated or coated with small granules.

Setae of the first 4 segments are longer than others and directed forward to form a cage. They are cross-barred, as is typical of other species of the genus. From the fifth segment the setae are gradually shorter but still slender and similarly cross-barred. Thick falcigerous setae are present only in postmedian segments.

The oral apparatus consists of a pair of thick palpi and a broad, tonguelike membrane with more than 80 digitate tentacles. They are

of a single kind and attached to the membrane so as to cover most of the lower side. The membrane is distally prolonged and deeply incised, shown in Pl. 29, fig. 1, in dotted line beyond the filaments. The prostomium is a small conical lobe; it has 4 eyes located at its greatest elevation. The mouth is a large triangular aperture between the palpal bases.

The first parapodium (Pl. 29, fig. 4) has long, slender papillae in both notopodia and neuropodia, chiefly postsetal in position. The notopodium has about 10 very long, slender, cross-barred setae and the neuropodium only about 4 similar setae. The next several parapodia are similar but the rami become farther apart and the lengths of setae diminishes posteriorly. The sixth parapodium has the proportions shown in plate 29, fig. 3.

Notopodial setae are slender and distally pointed throughout the body; the length/width relations of the cross-bars varies little (compare in plate 30, figs. 1, 2, 6 and 5). Neuropodial setae in anterior segments are much like notopodial setae. In median segments they are gradually thicker and by segment 78 they become falcigerous (Pl. 30, fig. 6). Farther back they are gradually thicker (Pl. 30, figs. 7-9) and fewer in a fascicle; their distal ends are entire.

*Piromis gracilis* differs from other species of the genus in having setae largely of the long, slender, distally pointed kind; falcigerous, distally pointed setae are present in postmedian neuropodia. The oral tentacular membrane is only moderately prolonged and medially incised. It is known only from western Mexico and Guatemala.

### Family CAPITELLIDAE

Four closely related species occur commonly in shallow ocean bottoms of San Pedro and Santa Monica Bays, usually in areas of waste discharge. The four may occur in the same grab sample (VELERO IV Sta. 5027, 1.9 mi from Point Fermin, California, in 38 fms, in dark black silty sand); usually only one is present, indicating a correlation with ecological and distributional factors. The species are here briefly diagnosed, based largely on a sample in which all four occurred.

### KEY TO *Capitella*-LIKE SPECIES

1. First visible segment without parapodia . . . . . 2
1. First visible segment with parapodia and setae . . . . . 3

2. Prostomium followed by a smooth peristomium, and this by 3 or 4 segments with pointed setae, and 6 or 5 segments with long handled hooks . . . . . *Capitomastus* sp.
2. Prostomium followed by a smooth peristomium and 6 setigers; in both male and female individuals the last 3 thoracic neuropodia with hooks, and notopodia with hooks in the 7th, and genital spines in the 8th and 9th segments . . . *Capitellides* sp.
3. Body larger, finely speckled with punctate dark spots; prostomium followed by 7 segments with pointed setae and 2 segments with genital spines in notopodia . . . *Capitella*, punctate
3. Body smaller, epithelium not punctate . . . . . 4
4. External surface of body villose; first 5 or 6 segments with setae in notopodia and neuropodia, followed by one segment with setae and hooks, and this with long handled hooks only . . . . . *Capitella*, villose
4. External surface of body smooth; in female individuals thorax consisting of 6 setigerous and 3 uncinigerous notopodia, and male individuals with 4 setigerous, 2 with setae and hooks mixed, and 3 with hooks (genital spines absent) . . . . .  
. . . . . *Capitella* ?*capitata*

None of these individuals agrees fully with the typical *Capitella capitata* (Fabricius), known from Greenland and boreal Atlantic seas, which is characterized as follows: in the male, the prostomium is followed by 6 setigerous notopodia and neuropodia, the seventh segment is variable or mixed (with setae and hooks) and the eighth and ninth notopodia have genital spines whereas the corresponding neuropodia have long handled uncini.

*Capitella capitata* (Fabricius) 1780 *ovincola* Hartman (1947, p. 405), from southern California, has the following formula. The male: prostomium followed by 4 setigerous notopodia and neuropodia, the next 3 segments are mixed, the eighth and ninth notopodia have genital spines and neuropodia have hooks. In the female the formula is the same except that the genital spines are replaced by long handled uncini.

Capitellid, genus and species probably unknown

*Collections.* Southern California, in shallow sandy bottoms, in depths of 10 to 30 ft (many).

Numerous individuals of a small capitellid, about the size of *Mediomastus californiensis* Hartman, and frequently in the same samples, differ from the latter in that the prostomium is acutely pointed, and directed obliquely downward. A pair of black eyespots is visible near its posterior margin. The everted proboscis is sacklike and covered with coarse papillae. The first segment is achaetous, with the ring nearly as long as the next, or first, setigerous segment. The first parapodia are uniramous and represented by notopodia only. The setigerous formula of the thorax may be expressed as follows: 9 notopodia with setae, one mixed and this followed by hooks; 7 neuropodia with setae, 2 with hooks, and this followed by hooks. Separation between thorax and abdomen is not sharp. It is thus possible that the thorax consists of 10 setigerous segments because the tenth notopodium has both setae and hooks.

Representatives of this form are seemingly limited to very shallow sandy bottoms of southern California.

#### Family MALDANIDAE

Genus *Clymenella* Verrill, 1873

?*Clymenella cincta* (Saint-Joseph) 1894

Fauvel, 1927, p. 182-183, fig. 63.

*Collection.* VELERO IV Sta. 5557. 3.4 mi from Pt. Conception light, California, in 12 fms, shaley rock.

Two large anterior ends agree with the account given by Fauvel (1927, p. 182). The cephalic plaque resembles that of *Asychis* spp. because the nuchal ridges are inconspicuous and limited to a short anterior part of the plaque. The collar on the fourth segment is conspicuous and followed by lesser collars on the next 3 segments. The single heavy spines in neuropodia of the first 3 segments agree with those described from western Europe.

This species is more widely known from western Europe.

#### EUCLYMENINAE, genus and species undetermined

Plate 33, figs. 2-5

*Collection.* VELERO IV Sta. 5538, 3.35 mi from Hyperion stack in Santa Monica Bay, California, 27.5 fms, in green mud.

This species lacks segmental collars. The first setigerous segment has 2 large spines in a neuropodium, the second has 3 such spines and the

third has 5 similar spines; more posterior segments have rostrate hooks in transverse series. The cephalic plaque has long, straight nuchal organs; eyes are absent. The pygidium is surrounded by 18 lobes in a circle, all about equally short and triangular in shape (Pl. 33, fig. 3). There are 6 anteanal segments (Pl. 33, fig. 2).

Typical neuropodia have rostrate hooks (Pl. 33, fig. 4) in which the large fang is surmounted by 4 teeth (Pl. 33, fig. 5).

### Family AMPHARETIDAE

Genus *Ampharete* Malmgren, 1866

Type *A. acutifrons* (Grube) 1860

*Ampharete labrops*, new species

Plate 34, figs. 1-4

*Collections.* The type is selected from VELERO IV Sta. 6694, taken 2 mi from Santa Barbara Point light, in 30 ft, from a bottom of fine sand with kelp. Others are from shallow shelf bottoms of southern California.

This is a small species; length of an ovigerous adult, posteriorly not quite complete, is 14 mm of which the thorax measures 10 mm; width in the thorax or widest part is 3 mm. The oral tentacles are pinnately divided and numerous, as is typical of the genus. The prostomium is subquadrate, wider than long and slightly prolonged forward at its median frontal margin. A pair of small, subcircular black eyespots is located near the postectal margins and can be seen by pushing the branchiae to the side. The middorsum of the body is smooth, the transverse segmental lines not conspicuous (Pl. 34, fig. 1).

The upper lip is large, broadly trilobed and ventrally bordered with many small black eyespots, best seen in ventral view (Pl. 34, fig. 2). Branchiae number 4 pairs; they are long and cirriform (Pl. 34, fig. 1) and all of one kind; they extend forward for a distance nearly equalling the thoracic length. They are inserted so that the 2 innermost are in contact medially, and the bases of the four are in two oblique series such that the two anterior are outermost, and the two posterior are innermost.

Paleae form conspicuous fascicles at the sides of the buccal region. They project forward and laterally, numbering about 11 on a side. All are similar and larger than any of the notopodial setae farther back. Each is long, straw-colored, tapers distally and is straight for most of its length but flexible and whiplike in its distal part (Pl. 34, fig. 3)

The thorax consists of 14 setigerous segments. The first 2 thoracic notopodia are smaller than others and have no neuropodial branch. The first one is smaller than the second, and the latter is about half as large as the third notopodium. Setae of the first 2 segments are in smaller fascicles than those farther back. The third setigerous segment is the first uncinigerous one. Segments 3 to 9 are ventrally crossed by broad glandular bands. The body tapers gradually thereafter and the glandular shields are absent after segments 12 to 14.

Thoracic uncini are not unusual; the cutting edge is provided with 4 larger and one much smaller basal teeth (Pl. 34, fig. 4).

*Ampharete labrops* is unique in having numerous dispersed eyespots along the margins of the large upper lip. The branchiae, numbering 4 pairs, are prolonged and slender. The species is unusually small for the genus, and has its distribution seemingly limited to the very shallow, sandy shelf of southern California. It is associated with many other kinds of polychaetes, including *Diopatra ornata* Moore in kelps, *Mediomastus californiensis* Hartman, other capitellids and *Prionospio* spp.

#### Family TEREHELLIDAE

Genus *Streblosoma* Sars, 1872

Type *S. bairdi* (Malmgren) 1866

*Streblosoma crassibranchia* Treadwell, 1914

Plate 14, figs. 5-8

*Collections.* Many individuals come from offshore areas in southern California, in silty and mixed sediments.

Thoracic segments vary from 18 in smaller to 31 in larger individuals. The posterior end of the thorax is abruptly narrowed at the first uncinigerous segment. The peristomium has many eyespots. A broad glandular shield crosses the ventrum of 6 postbranchial segments. Numerous filiform branchiae are present on setigerous segments 1, 2 and 3; they form tufts, the number of filaments increasing from about 9-10 in the first, to 13-14 in the third branchial tuft.

Uncini are first present from the fourth (=first postbranchial) segment. They have a characteristic structure (Pl. 14, figs. 7, 8); a large fang is directed downward abruptly to the plaque, and surmounted by 3 teeth in a transverse row. Abdominal uncini (Pl. 14, figs. 5, 6) are similar but somewhat broader; the arrangement of the distal teeth is the same.

This species constructs characteristic tubes; they are closely spiralled in one direction for about half their length, and in the opposite direction for the other part. Tubes are friable, usually reddish brown, and found in sediments of sandy silt.

*S. crassibranchia* is considered distinct from *S. bairdi* (Malmgren) which has been reported from southern California (Berkeley and Berkeley, 1941, p. 54); the latter has uncini of another kind, in which the main fang is surmounted by more numerous teeth in 3 rows.

*S. crassibranchia* is known only from southern California.

### Family SABELLIDAE

#### Genus *Distylidia*, new genus

Type *D. rugosa* (Moore) 1904 (as *Distyilia*)

This genus is most clearly characterized by its rugose folds in the posterior part of the body; they cover an extensive area on the dorsal surface and fade anteriorly. The branchial crown is large, at the base spirally coiled with about one and a fourth turns; radioles are numerous, 55 or more on a side, and provided with crowded double rows of eye-spots in irregular distribution. The collar is prominent and two-lobed. Thoracic setigerous segments number 8, and abdominal segments more than 100. Thoracic notosetae are longer, slightly limbate, to shorter, more broadly limbate, but the transition is gradual. Thoracic uncini are avicular and accompanied by pick-axe hooks.

*Distylidia rugosa* (Moore) is known only from southern California. Another species, reported as *Bispira rugosa monterea* Monro (1933, p. 1076) from Balboa, Panama, is congeneric, and requires a new specific name. It was first considered to be the same as *Distyilia monterea* Chamberlin (1919) from California; this has been referred to *Eudistyilia polymorpha* (see Hartman, 1959b, p. 543). The species from Panama is here renamed *Distylidia monroi*, new name. It differs from *D. rugosa* (Moore) in having only 2 or 3 pairs of eyes and in the character of the thoracic collar.

#### Genus *Potamilla* Malmgren, 1866

Type *P. neglecta* (Sars) 1851

*Potamilla* sp.

*Collections.* Several individuals come from southern California in shelf depths.

These individuals have affinities with *P. neglecta* (Sars) (see Berkeley and Berkeley, 1952a, p. 116) but consistently differ in having many eyes on the branchial radioles.

### PROTODRILIDAE

Genus *Saccocirrus* Bobretzky, 1872

Type *S. papillocercus* Bobretzky, 1872

*Saccocirrus papillocercus* Bobretzky, 1872

Fauvel, 1927, p. 430, fig. 145.

*Collections.* VELERO IV Stations 2741 (many); 6205 (350+), both off southern California, in red sands, in less than 15 fms.

Length of larger individuals is about 30 mm; width less than 0.8 mm; segments number 100 to 150. The anterior end has a pair of prehensile palpi resembling those of some spionids. The anal end has a pair of lateral anal lobes, each with 5 to 6 papillae. Parapodia are greatly reduced; in the female they are present from the second, and in the male from segments 8 to 12, and continue on segments farther back. Parapodia have simple setae in uniramous fascicles. Each seta is straight, acicular and distally bifid.

*S. papillocercus* in southern California is associated with a characteristic fauna including a lancelet, *Pisone remota* (Southern), *Lumbrineris acuta* (Verrill), *Aricidea furcata* Hartman, and others, in sediments of red sand. It is more widely reported from cosmopolitan areas (see Fauvel, 1927, p. 430).

### DINOPHILIDAE

Genus *Dinophilus* O. Schmidt, 1848

Type *D. vorticoides* Schmidt, 1848

*Dinophilus gyrociliatus* O. Schmidt, 1857

Marcus, 1948, pp. 7-11, figs. 17-28.

*Collections.* Specimens are taken occasionally in culture tanks in which water is supplied from intertidal areas of southern California. Adults measure less than a mm long and are best characterized by the presence of their 5 or 6 segmentally arranged narrow ciliated bands; setae are altogether absent.

First named from the Mediterranean Sea, this has a cosmopolitan distribution, in fine sands at intertidal levels.

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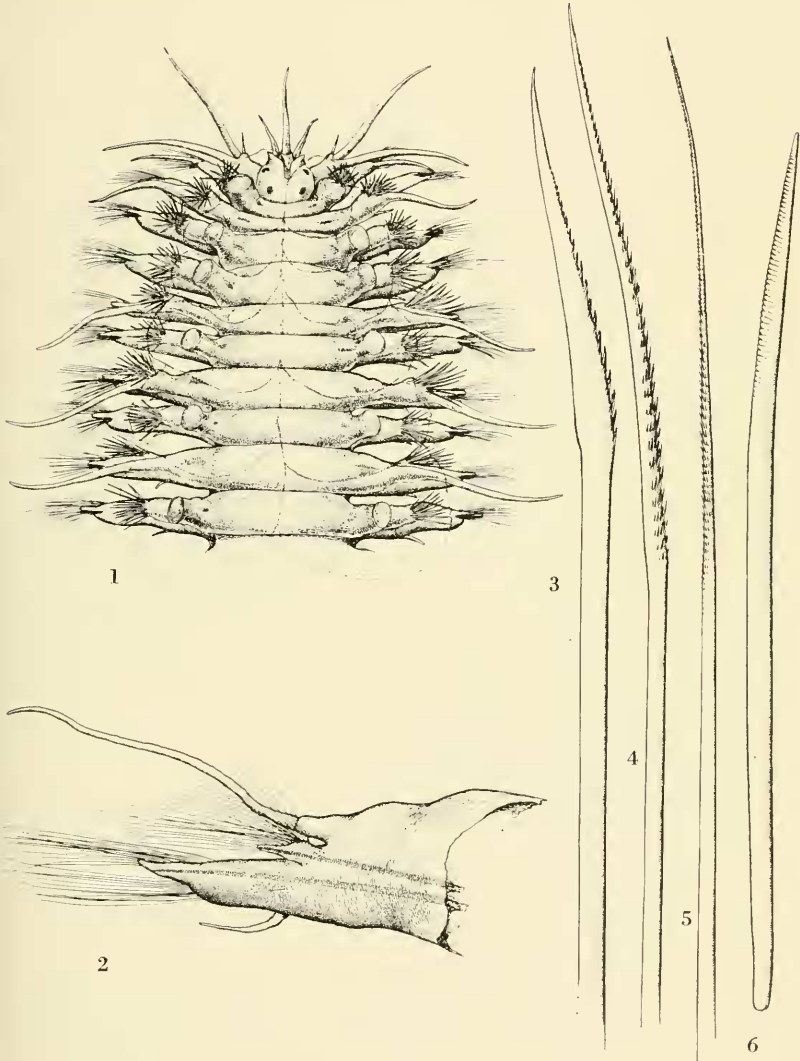


# PLATES

## PLATE 1

*Hesperonoë laevis*, new species (Sta. 5400)

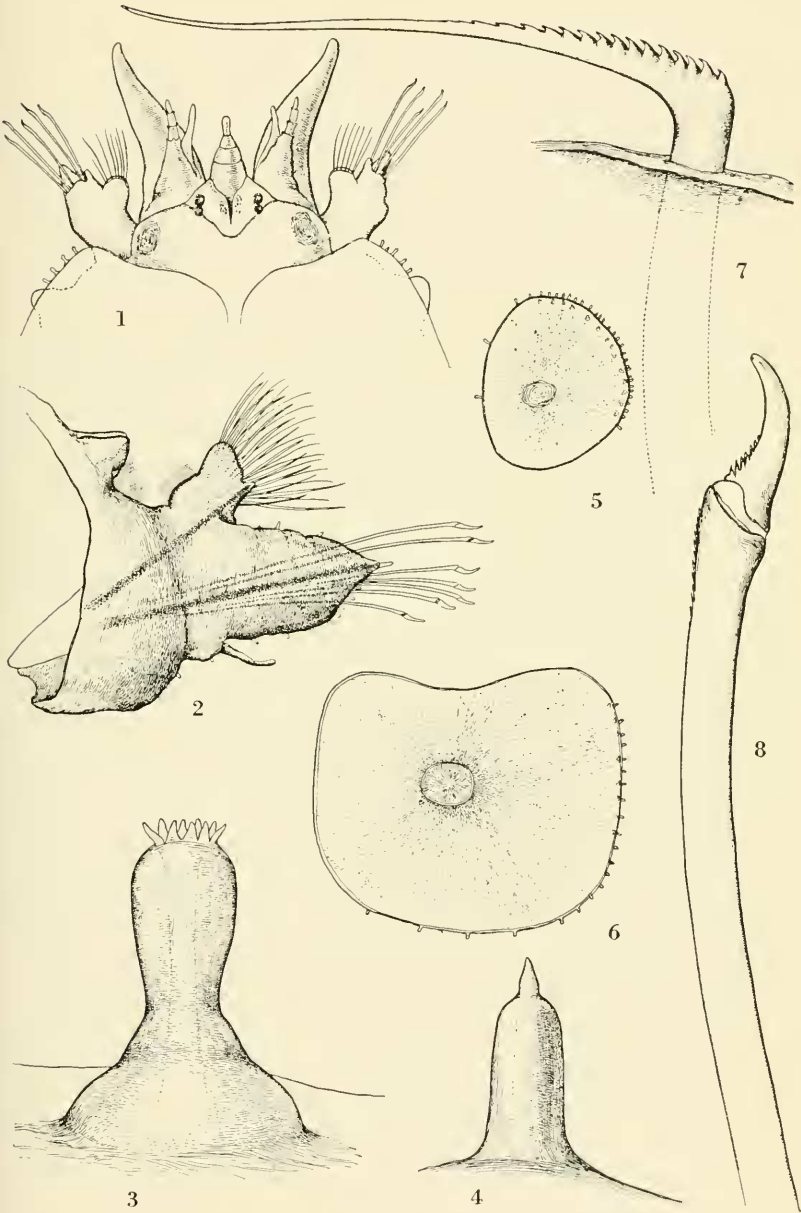
1. Anterior end, including first eleven segments, with elytra indicated by dotted lines, in dorsal view, x 18.
2. A median parapodium in posterior view, x 38.
3. An inferior neuropodial seta from a median parapodium, x 800.
4. A superior neuropodial seta from a median parapodium, x 800.
5. A slender notopodial seta from a median parapodium, x 800.
6. A thicker, shorter notopodial seta from the same parapodium, x 800.



## PLATE 2

*Pholoë glabra*, new species (Sta. 2233)

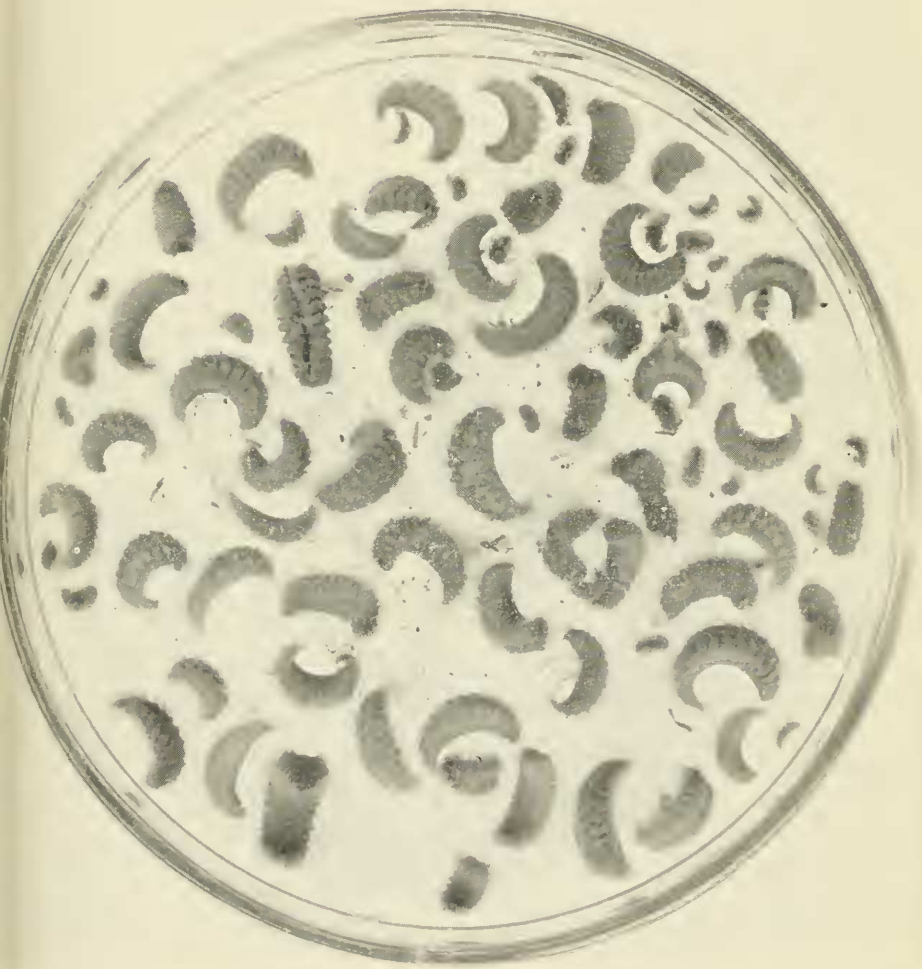
1. Anterior end in dorsal view showing prostomium and first two segments, x 142.
2. A median parapodium in anterior view, x 167.
3. Submarginal papilla from the first elytrum, x 2500.
4. Marginal papilla from the first elytrum, x 2500.
5. First elytrum seen in dorsal view, x 70.
6. Elytrum from a median segment, seen from above, x 90.
7. A superior notopodial seta from a median segment, x 3000.
8. A neuropodial falcigerous seta from a median parapodium, x 1670.



## PLATE 3

*Chlovia pinnata* Moore (Sta. 2189)

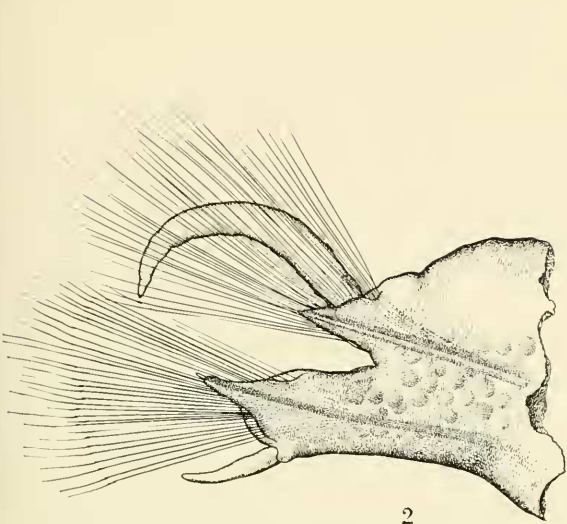
Part of a sample showing adults and various stages of growth that may be taken at any time of the year in southern California, x 14.



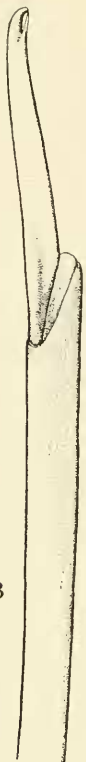
## PLATE 4

*Amphiduros pacificus*, new species (Sta. 1441)

1. Anterior end in dorsal view, x 50.
2. A median parapodium in anterior view, x 60.
3. A long-appendaged composite seta, x 1000.
4. A short-appendaged composite seta, x 1000.



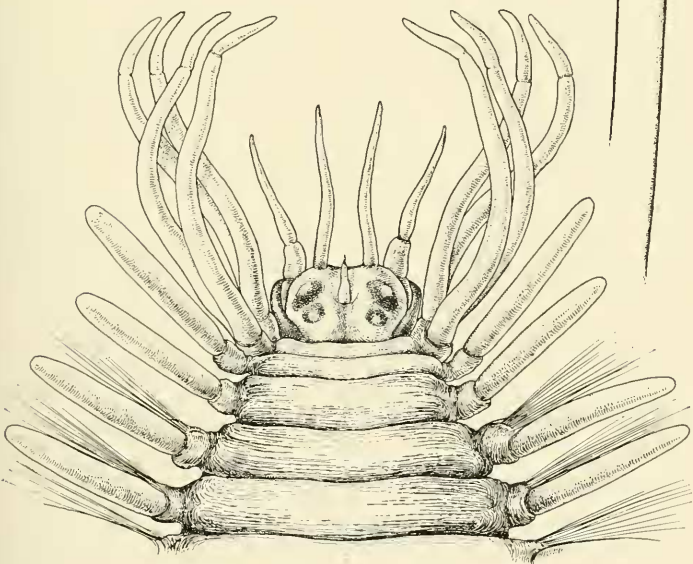
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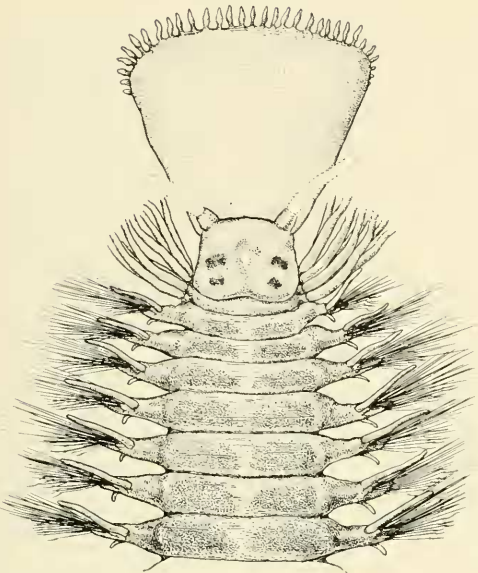


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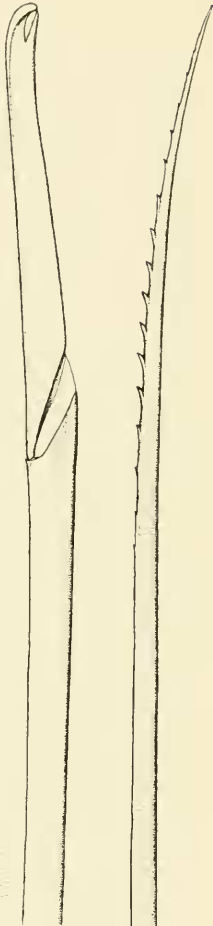
## PLATE 5

*Oxydromus brunnea*, new species (Sta. 2402)

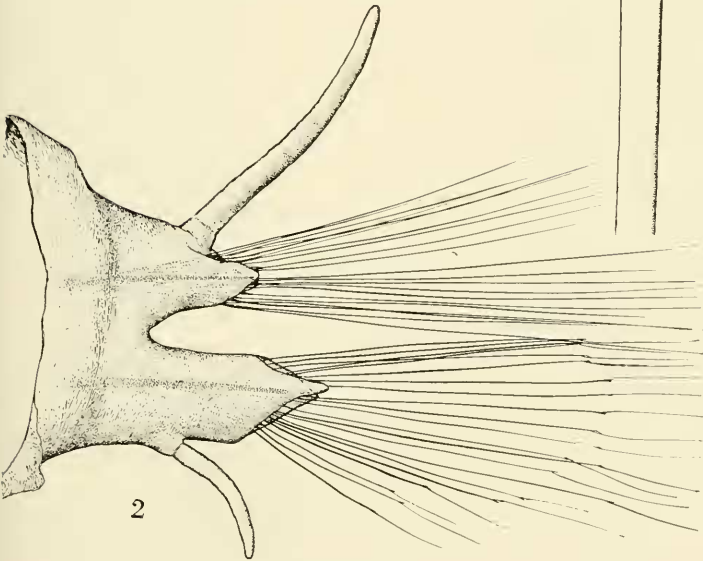
1. Anterior end with proboscis everted, in dorsal view, x 72. (Cirri-form processes were lost before the drawing was made)
2. A median parapodium in anterior view, x 430.
3. Distal end of a notopodial seta, x 2100.
4. Distal end of a neuropodial seta, x 2100.



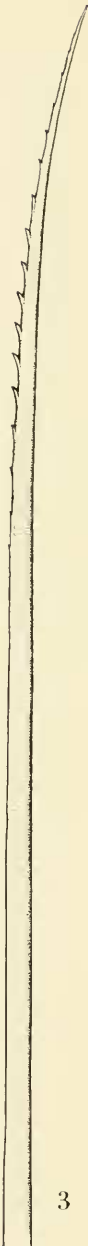
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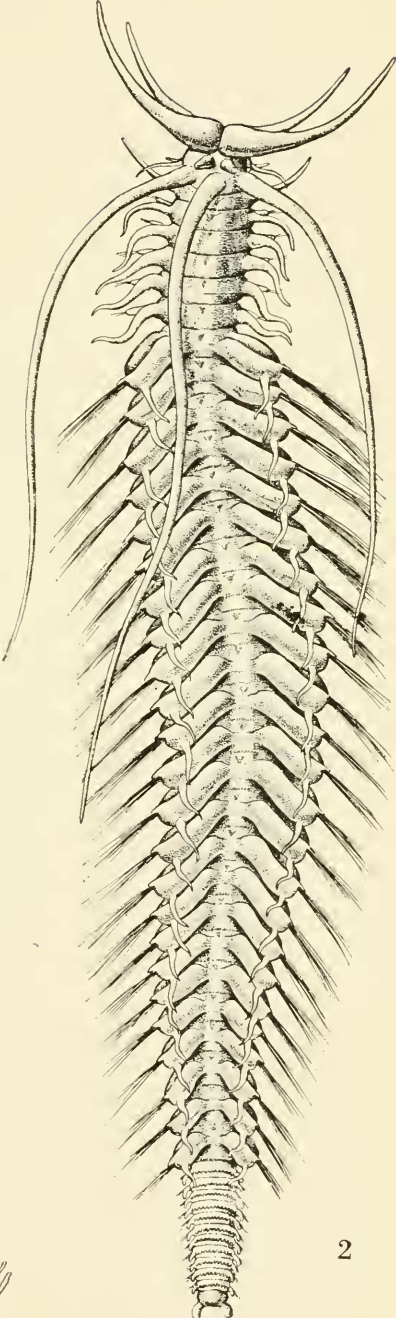
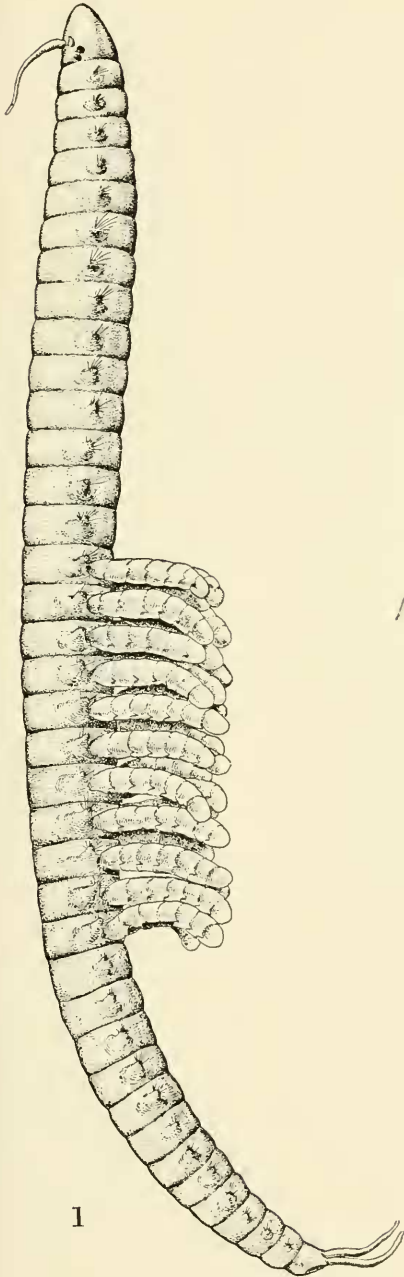
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## PLATE 6

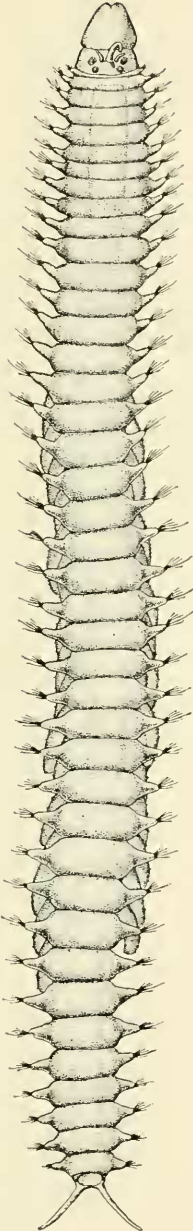
1. *Exogone uniformis*, new species. Adult female in right lateral view, with ventrally attached juveniles, x 80.
2. *Autolytus ?cornutus* Agassiz. Eritokous male in dorsal view, x 75.



## PLATE 7

*Exogone uniformis*, new species (Sta. 5102)

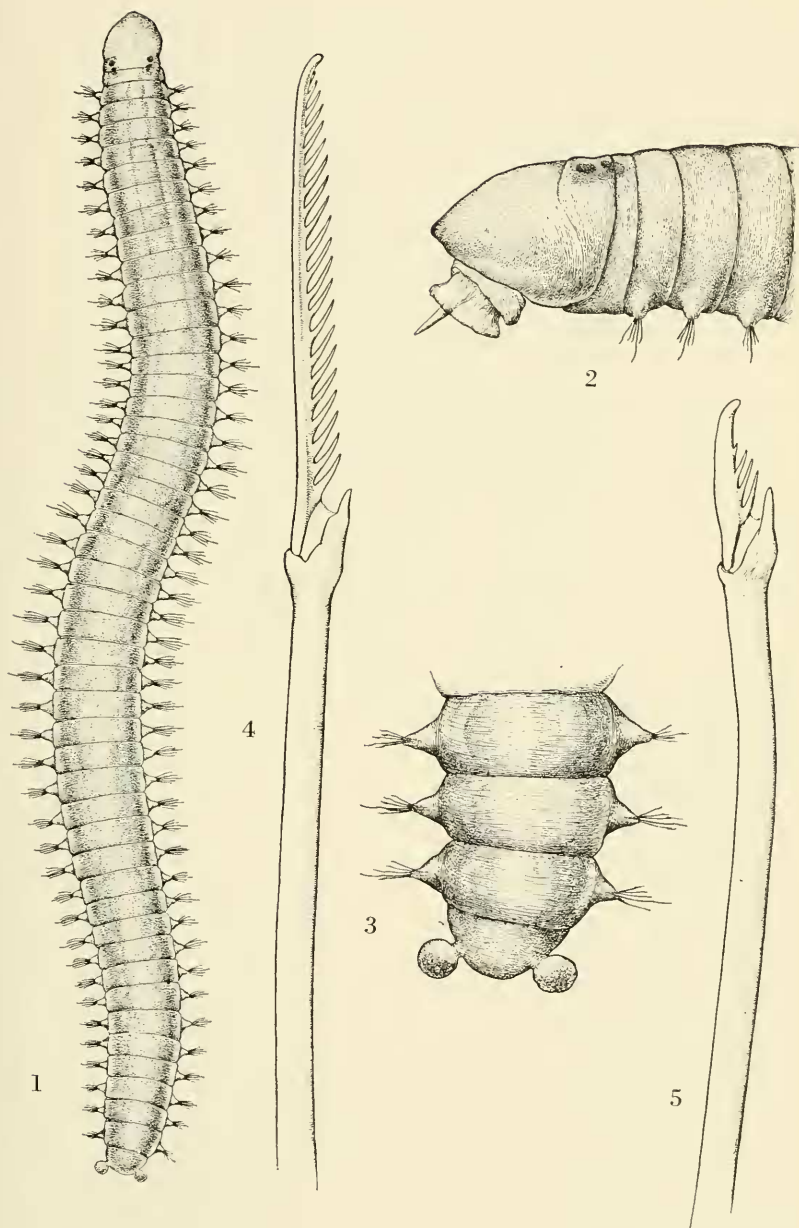
1. Entire animal in dorsal view, x 85.
2. A composite falcigerous seta, one of three similar setae, x 7290.
3. A simple, distally curved hook showing distal denticulations, x 7290.
4. A composite spinigerous seta from a typical parapodium, x 7290.



## PLATE 8

*Exogonella brunnea*, new genus and species (Sta. 5102)

1. Entire animal in dorsal view, x 72.
2. Anterior end in left lateral view, showing partly everted proboscis, x 216.
3. Posterior end with pygidial processes, in dorsal view, x 216.
4. Superior falcigerous seta from a median parapodium, x 6300.
5. Inferior falcigerous seta from a median segment, x 6300.



## PLATE 9

## Tubes of ONUPHIDAE

Upper. *Diopatra ornata* Moore (Sta. 4770) showing parts of three tubes and a specimen protruding from the tube at the left, x 1.

Lower left. *Nothria pallida* Moore (Sta. 4846), showing two tubes and specimen removed from one of them, x 1.

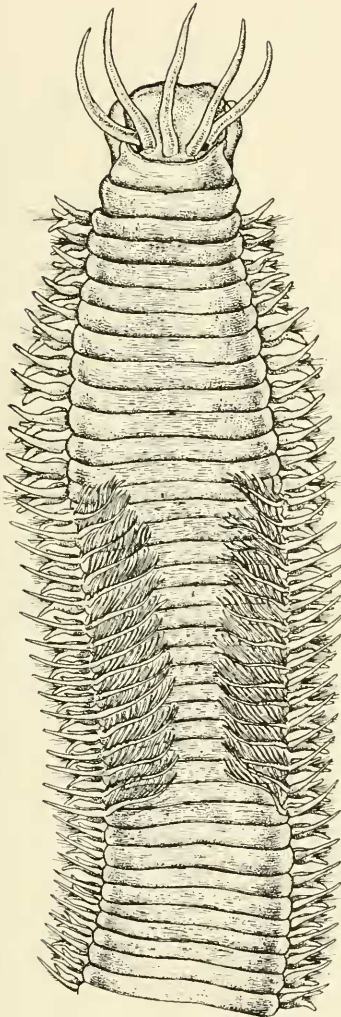
Lower right. *Diopatra tridentata* Hartman (Sta. 2831) showing two tubes, x 1.



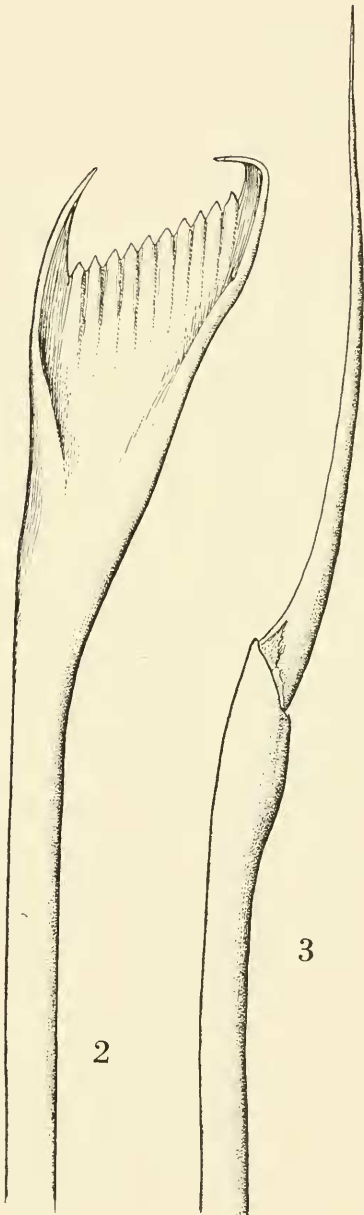
## PLATE 10

*Marpysa disjuncta*, new species (Sta. 2107)

1. Anterior end in dorsal view, showing prostomium, prebranchial and branchial regions, x 10.
2. Comb seta from a postbranchial segment, x 275.
3. A composite spiniger showing distal end of shaft and appendage, x 275.



1



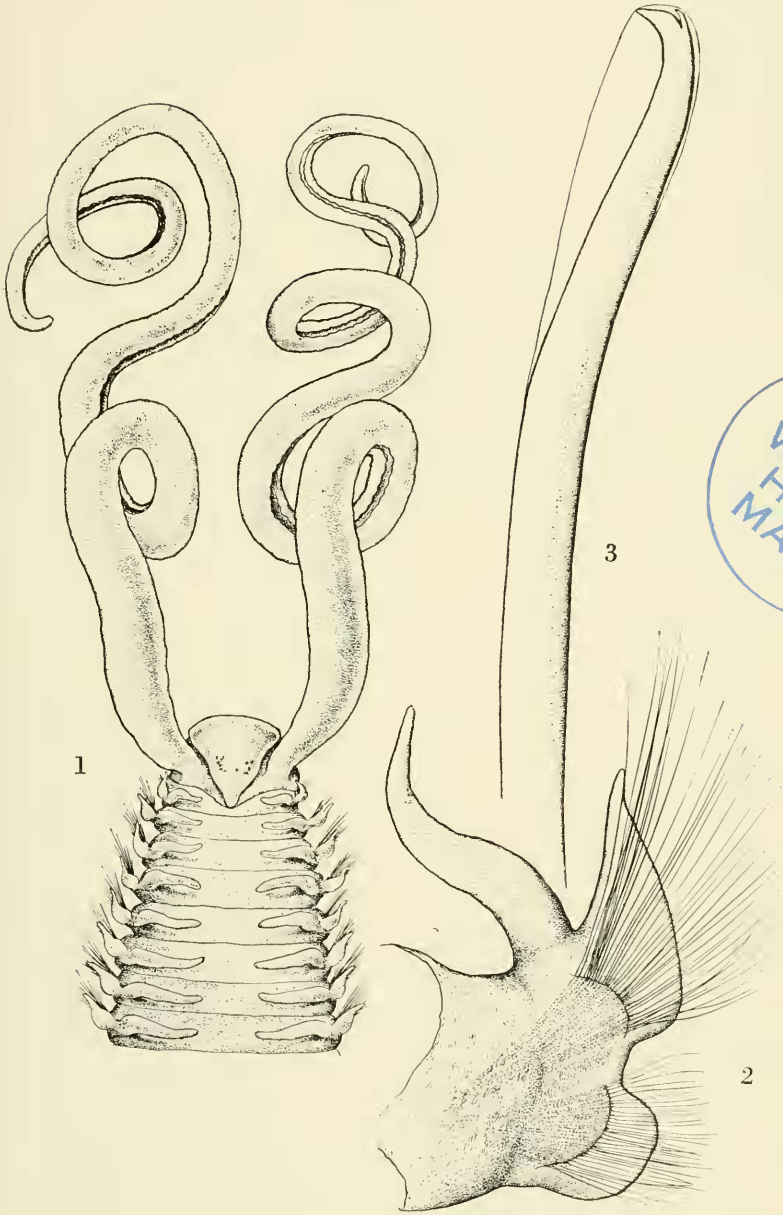
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## PLATE 11

*Spio punctata*, new species (Sta. 5095)

1. Anterior end in dorsal view, x 40.
2. A ninth parapodium in anterior view, x 110.
3. A neuropodial hooded hook from a postmedian segment, x 3570.

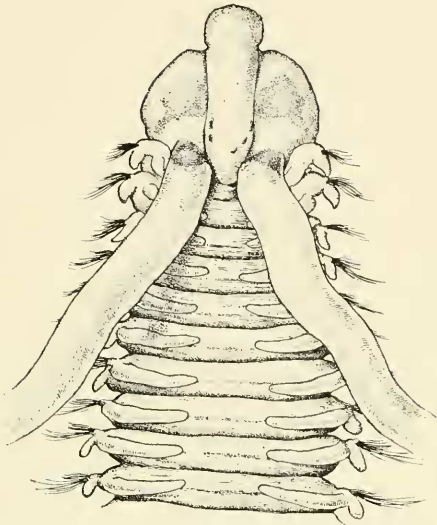


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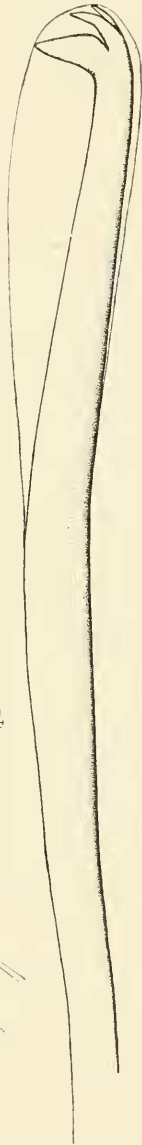
## PLATE 12

*Nerinides maculata*, new species (Sta. 2624)

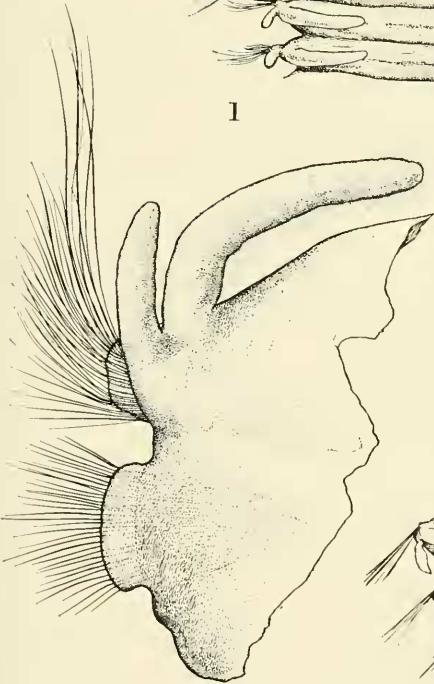
1. Anterior end in dorsal view, x 15.
2. Posterior end in dorsal view, x 15.
3. Ninth parapodium in posterior view, x 55.
4. A hooded hook from a median segment, x 3300.



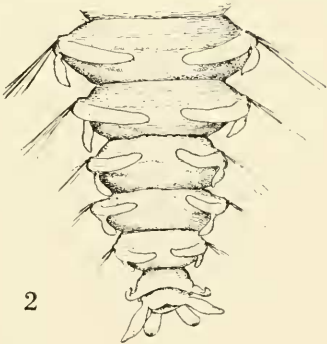
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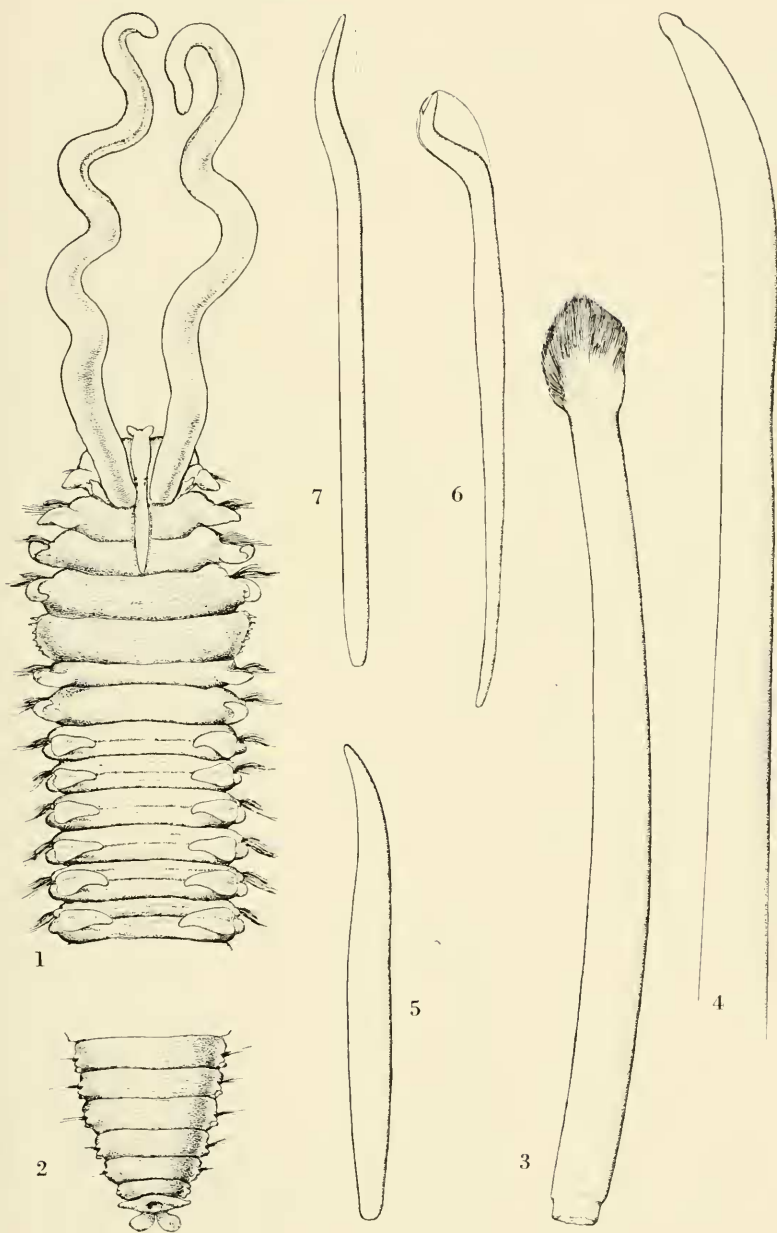


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## PLATE 13

*Boccardia basilaria*, new species (Stations 5161 and 2217)

1. Anterior end through segment 13, in dorsal view, x 29.
2. Posterior end showing pygidial processes and last six segments, in dorsal view, x 29.
3. Bristle-topped spine from fifth setigerous segment, x 1070.
4. Accompanying acicular spine from fifth setigerous segment, x 1070.
5. Acicular spine with simple falcate tip, from fifth setigerous segment, x 714.
6. A neuropodial hooded hook from seventh (first uncinigerous) segment, x 1140.
7. A neuropodial hooded hook from a far posterior segment, x 1140.



## PLATE 14

*Polydora neocardalia*, new species (Sta. 2217)

1. Eighth parapodium, in anterior view, x 240.
2. A neuropodial hook from a posterior segment, x 3250.
3. A neuropodial hook from eighth neuropodium, x 3250.
4. A short notopodial seta from eighth parapodium, x 3250.

*Streblosoma crassibranchia* Treadwell (Sta. 2076)

5. Abdominal uncinus seen from the front, x 4800.
6. Abdominal uncinus seen from the side, x 4800.
7. Thoracic uncinus seen from the front, x 1700.
8. Thoracic uncinus seen from the side, x 1700.



## PLATE 15

Habitat of *Boccardia uncata* Berkeley in Newport Bay, California (Sta. 4907), forming muddy tubes clustered between oyster shells, *Ostrea lurida* Carpenter, partly covered with a small barnacle, *Chthamalus fissus* Darwin, exposed at normal low tide. x 12.6.



## PLATE 16

Habitat of *Polydora websteri* Hartman in Newport Bay, California (Sta. 4907), forming U-shaped runways etched in exposed surfaces of oyster shells, exposed at normal low tide. The slender white tubes on the cluster at the left are those of *Eupomatus gracilis* Bush. x 1.8.



## PLATE 17

*Polydora websteri* Hartman

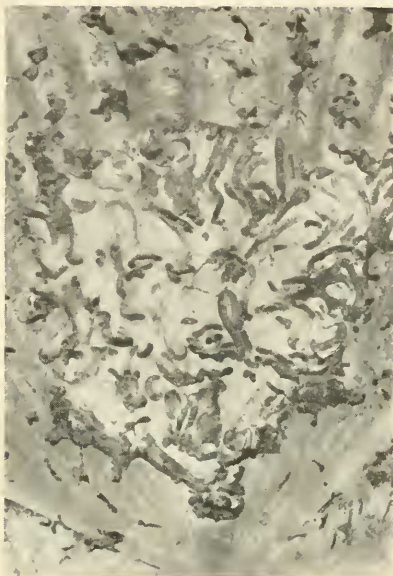
Lower right. Exposed valve of commercial oyster from Connecticut, seen from the inner side, showing mud blisters caused by *P. websteri*, x 0.84.

Exposed valve of the same shell, seen from the outer side, showing U-shaped apertures of *P. websteri*, x 0.84.

Upper left. Scallop shell, *Patinopecten caurinus* (Gould) from Winchester Bay, Oregon, in 20-40 fms, attacked by *P. websteri*, x 0.75.

Upper right. Same valve as preceding, seen from the inner side, showing mud blisters caused by *P. websteri*, x 0.75.

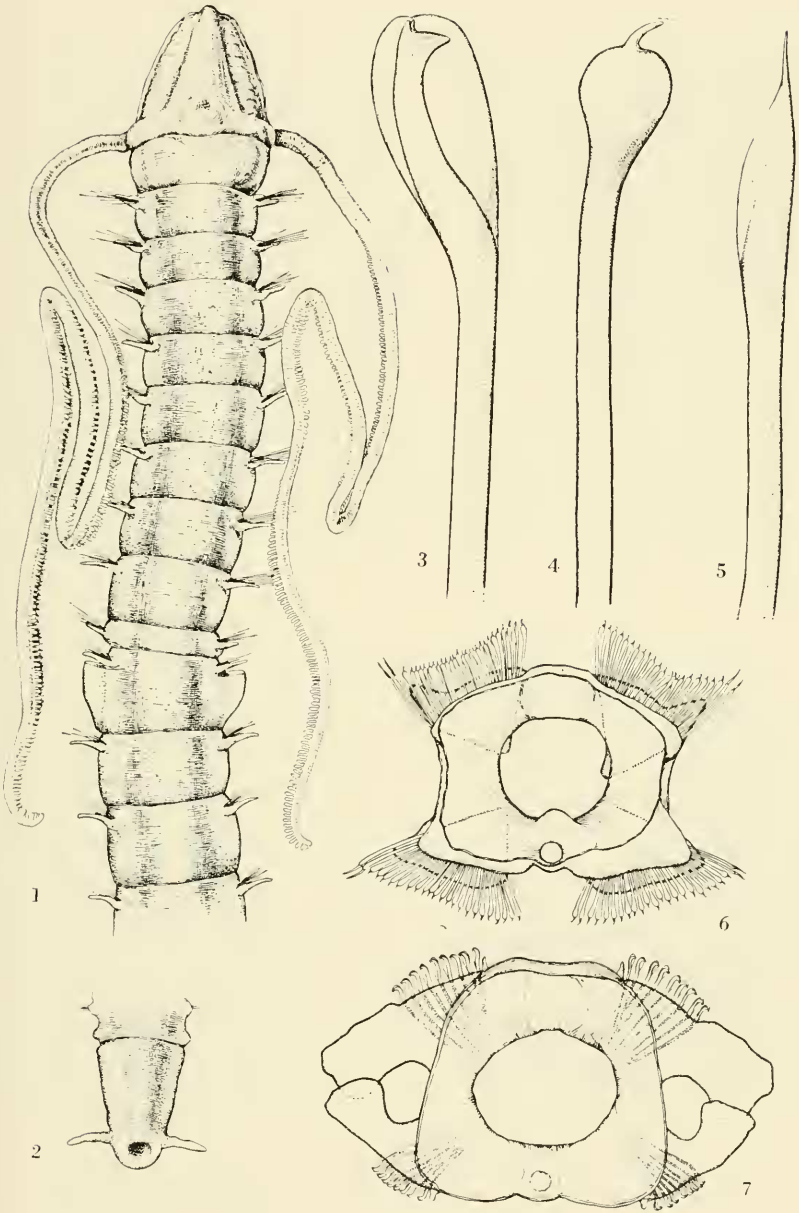
Lower left. Enlarged portion of U-shaped burrows, near the hinge of *Patinopecten caurinus*, seen from the outside, x 3.5.



## PLATE 18

*Magelona sacculata*, new species (Sta. 2311)

1. Anterior end in dorsal view showing thorax and four abdominal segments, x 70.
2. Posterior end showing pygidium with lateral processes and last segments, x 70.
3. A hooded hook from an abdominal segment, in lateral view, x 1500.
4. A modified mucronate seta from the ninth segment, x 1500.
5. An accompanying slender seta from the ninth segment, x 1500.
6. Cross section of the ninth or modified segment, showing arrangement of parapodial lobes and setae, seen from the front, x 260.
7. Cross section of an abdominal segment, showing the arrangement of parapodial lobes and hooks, seen from the front, x 260.



## PLATE 19

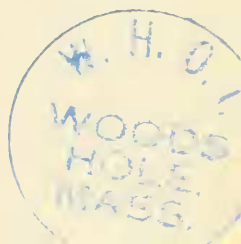
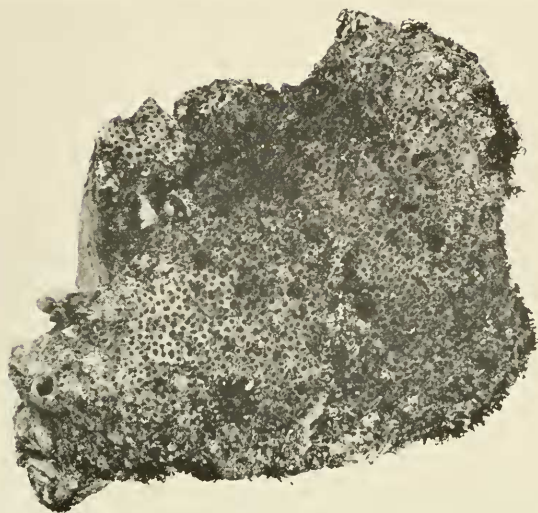
- Upper left. *Telepsavus costarum* Claparède (Sta. 5254), translucent, annulated tubes from a large sample, x 1.
- Lower left. *Phyllochactopterus prolifica* Potts (Sta. 5030), showing irregularly twisted, opaque tubes taken from a larger mass, x 1.
- Upper right. *Chaetopterus variopedatus* (Renier) (Sta. 5254) removed from a large, U-shaped parchmentlike tube, x 1.
- Lower right. *Chaetopterus variopedatus* (Renier) (Sta. 5030), showing three tubes, part of a large clump massed together, x 0.5.



## PLATE 20

Upper. Part of tube mass of *Dodecaceria fewkesi* Berkeley and Berkeley, from Abalone Cove, near Marineland, California, at lowest tidal exposure, seen from the exposed surface, x 1.2.

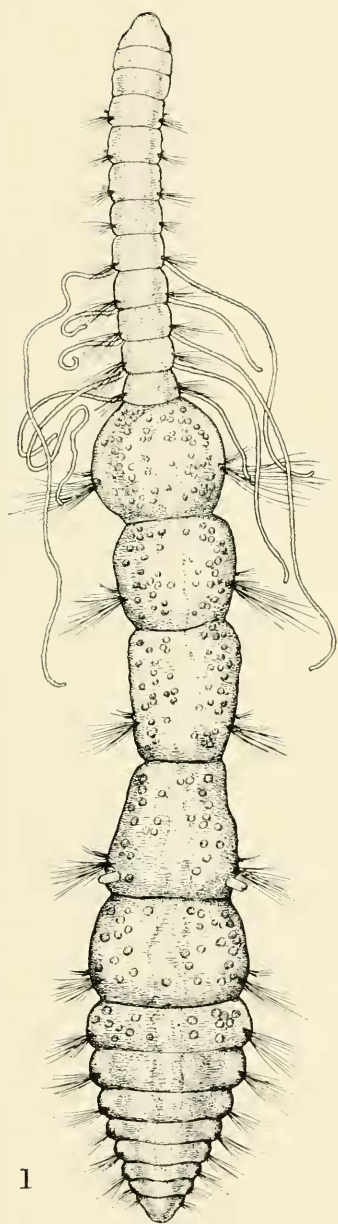
Lower. Part of tube mass of *Phragmatopoma californica* (Fewkes), from Abalone Cove, near Marineland, California, in *Mytilus* zone, exposed at normal low tide, x 1.1.



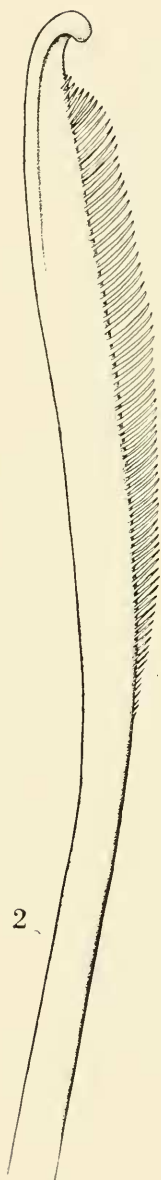
## PLATE 21

*Ravicirrus maculata*, new genus and species (Sta. 5027)

1. Entire animal in dorsal view, x 50.
2. A neuropodial seta seen from the side, x 1100.
3. A notopodial seta seen from its greatest width, x 1100.



1



2

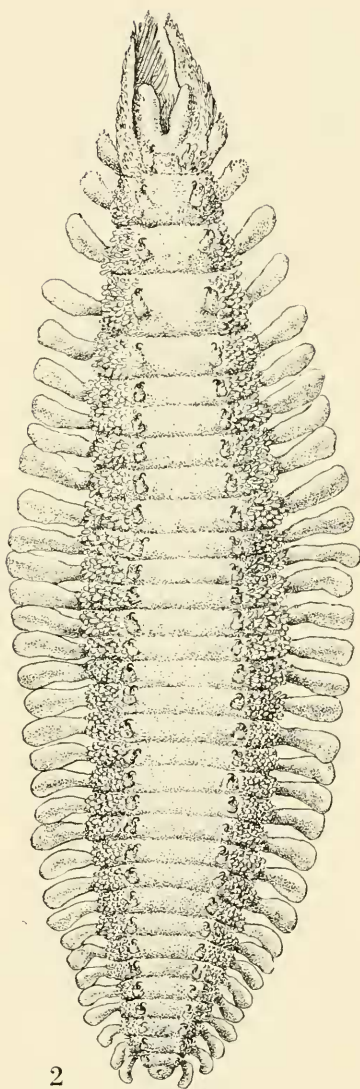
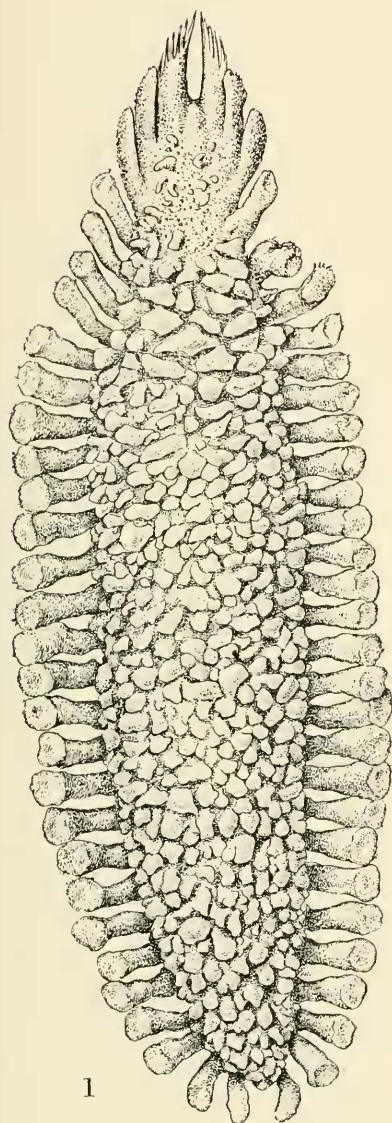


3

## PLATE 22

*Flabelligera essenbergae*, new name (Sta. 1443-41)

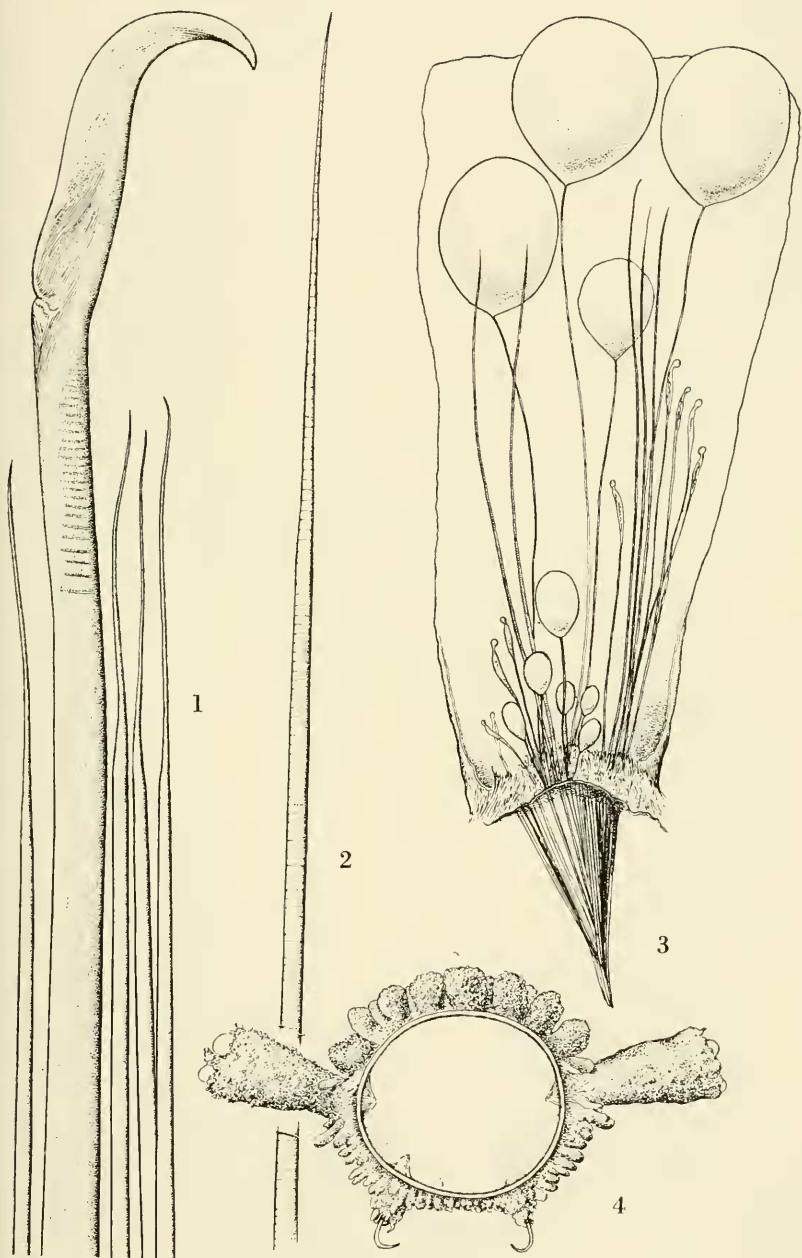
1. Entire animal in dorsal view, x 12.
2. Entire animal in ventral view, x 12.



## PLATE 23

*Flabelligera essenbergae*, new name (Sta. 1443-41)

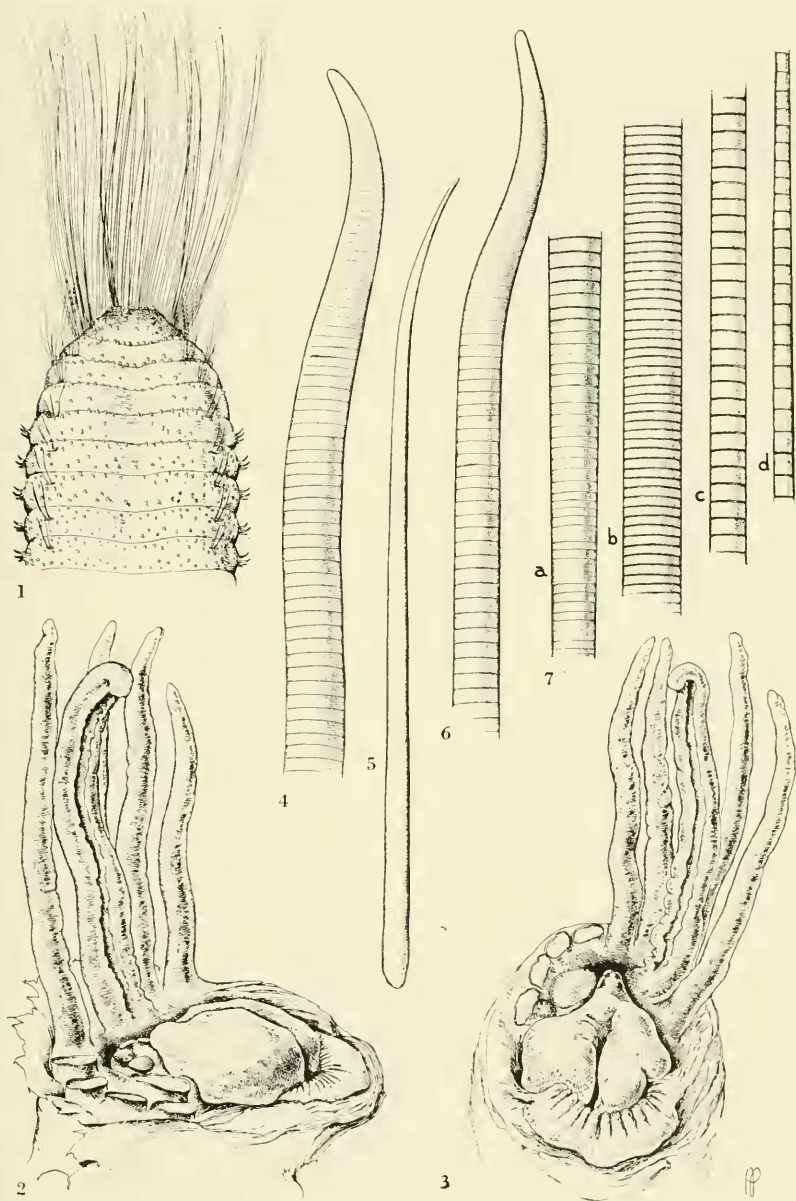
1. Neuropodial setal fascicle from tenth parapodium, x 214.
2. Notopodial seta from tenth parapodium, x 214.
3. Notopodial fascicle dissected out of investing sheath, showing two kinds of papillae, x 90.
4. Cross section of middle region of body, showing notopodia, neuropodia and surface pustules, x 20.



## PLATE 24

*Pherusa papillata* (Johnson) (from Washington)

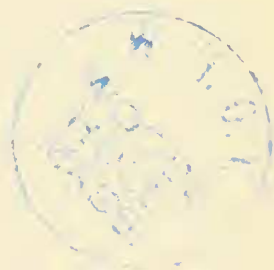
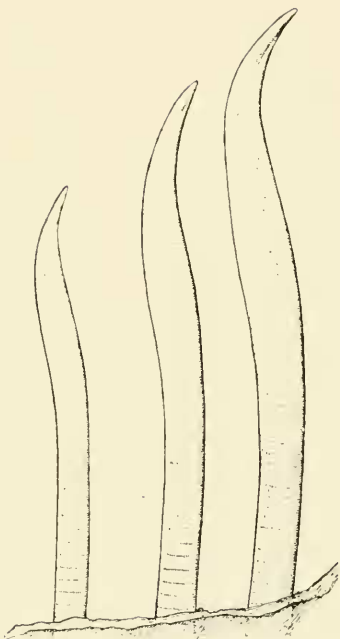
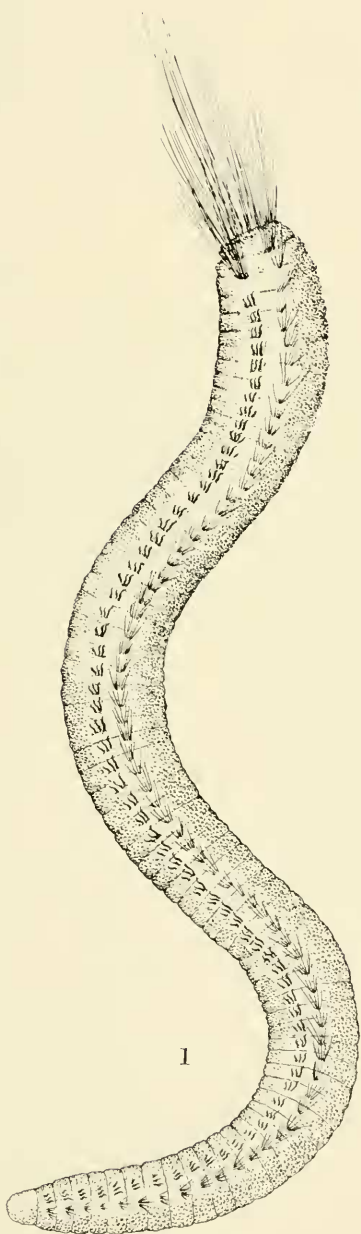
1. Anterior end in dorsal view, showing distribution of papillae and arrangement of anterior setae, x 10.
2. Anterior end seen from the right side, with right palp and tentacles cut off near the base, showing the semicircular arrangement of the four eyes, x 30.
3. Anterior end seen from the front, showing left palp and four left tentacles in place, and the small beaked prostomium with four eyes, large oral slit and peristomium, x 28.
4. Thickest neuropodial hook from fourteenth last segment, x 280.
5. Companion seta from fourteenth last neuropodium, x 280.
6. Slenderest hook from fourteenth last neuropodium, x 280.
7. Portions of a long seta from the first setigerous segment, x 195;  
a, near base, b, near middle, c, toward tip, d, near tip.



## PLATE 25

*Pherusa neopapillata*, new species (Sta. 5102)

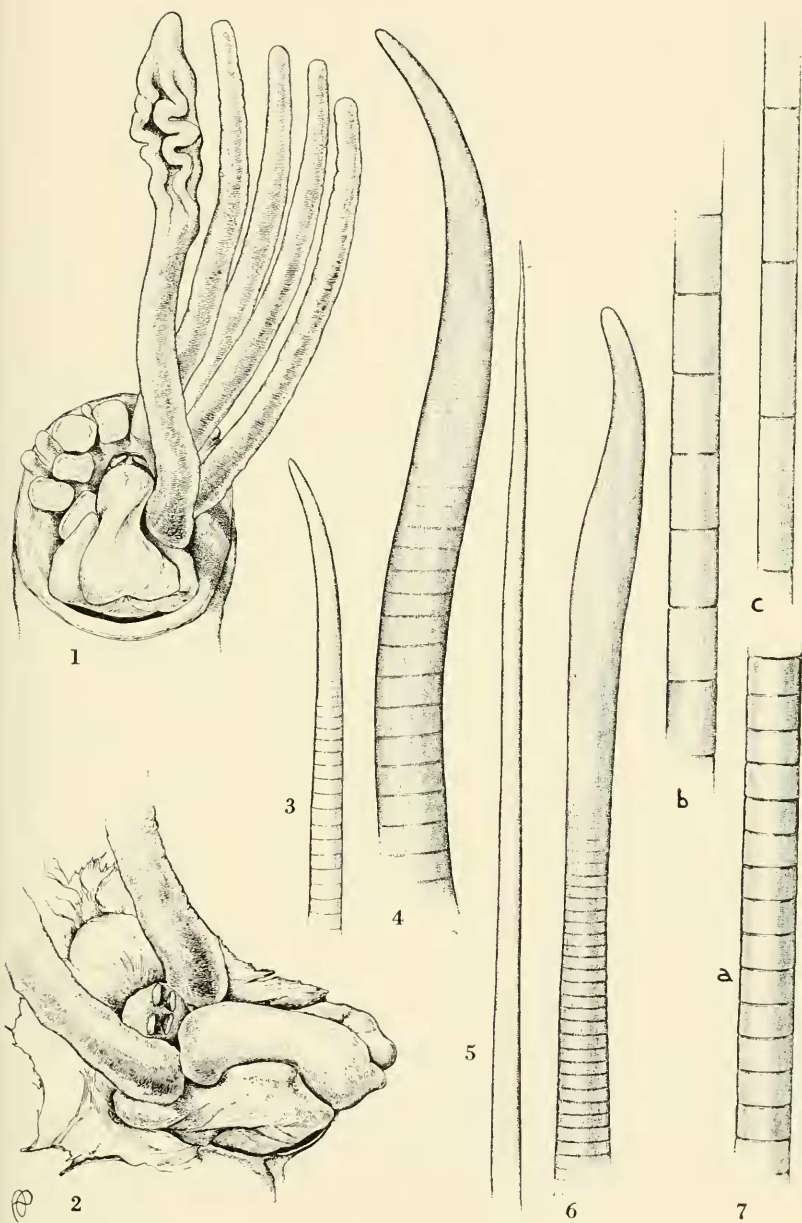
1. Entire animal in left lateral view, x 13.
2. A neuropodial fascicle from anterior third of body, x 3500.



## PLATE 26

*Pherusa neopapillata*, new species (Stations 1205 and 1136)

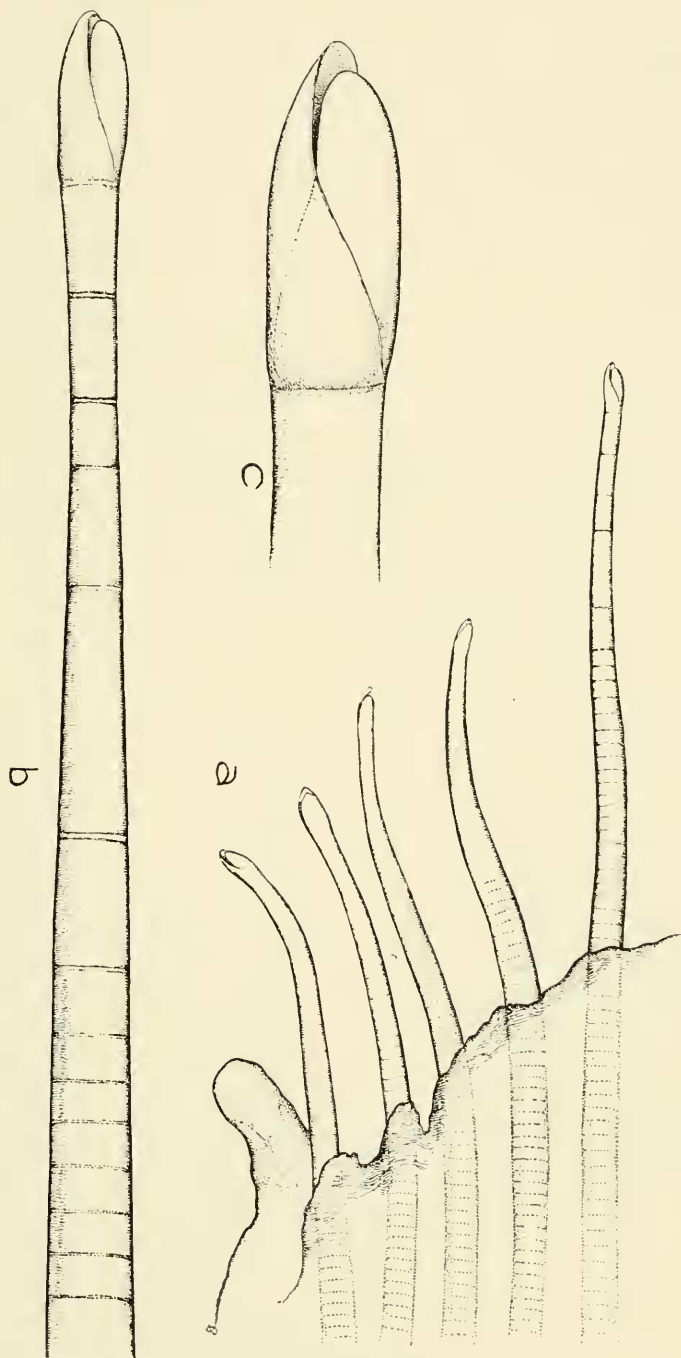
1. Anterior end seen from the front, with right palp and tentacles cut off near base, showing left palp and tentacles in place, the small prostomium with 4 eyes and the peristomium, x 54.
2. Anterior end seen from the side, with proboscis partly everted, showing arrangement of the four prostomial eyes and insertion of palpi, x 60.
3. Distal portion of a smallest hook from a median region, x 250.
4. Distal portion of a largest hook from the same segment, x 250.
5. Companion seta from the fourth segment, x 250.
6. Neuropodial hook from the fourth segment, x 250.
7. Portion of a seta from the first segment, x 362; a, near base, b, towards middle, c, towards tip.



## PLATE 27

*Piromis arenosus* Kinberg (South Africa)

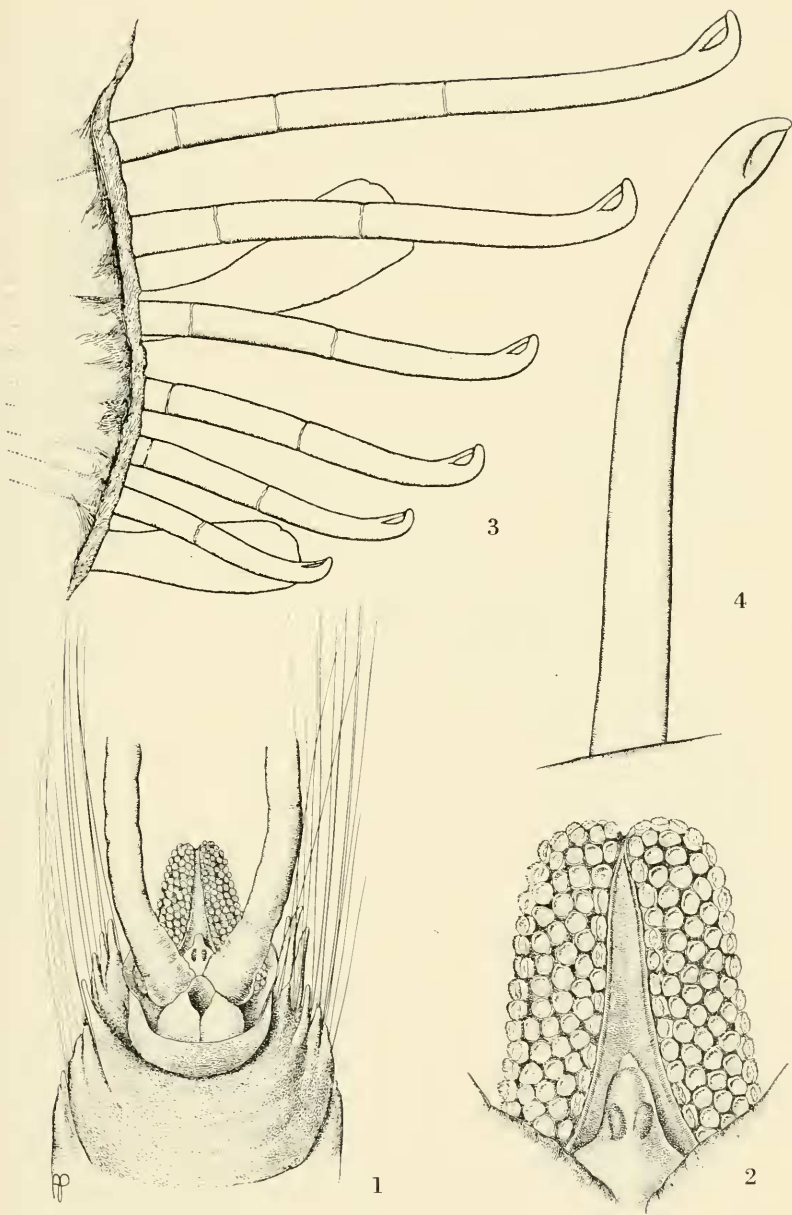
- a. A median neuropodium showing an entire setal fascicle, x 195.
- b. Uppermost neuropodial seta from the same parapodium, x 585.
- c. Bifid tip of a neuropodial seta, x 1151.



## PLATE 28

*Piromis roberti* (Hartman) (Gulf of Mexico)

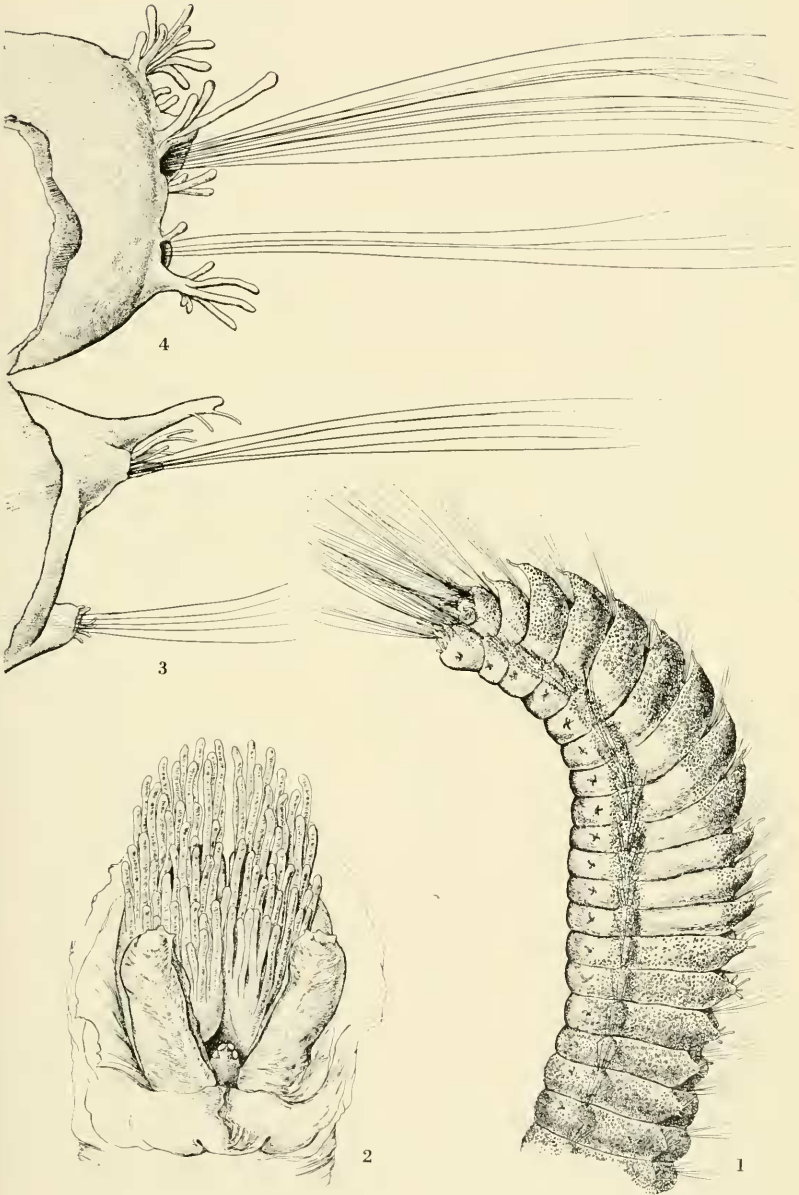
1. Anterior end with oral structures everted, oral tentacles fallen away, x 21
2. Prostomium and overhanging tentacular base, in ventral view, x 53.
3. A neuropodial fascicle from a median parapodium, x 22.
4. Distal end of a bifid neuropodial seta, x 445.



## PLATE 29

*Piromis gracilis*, new species (Sta. 930-39)

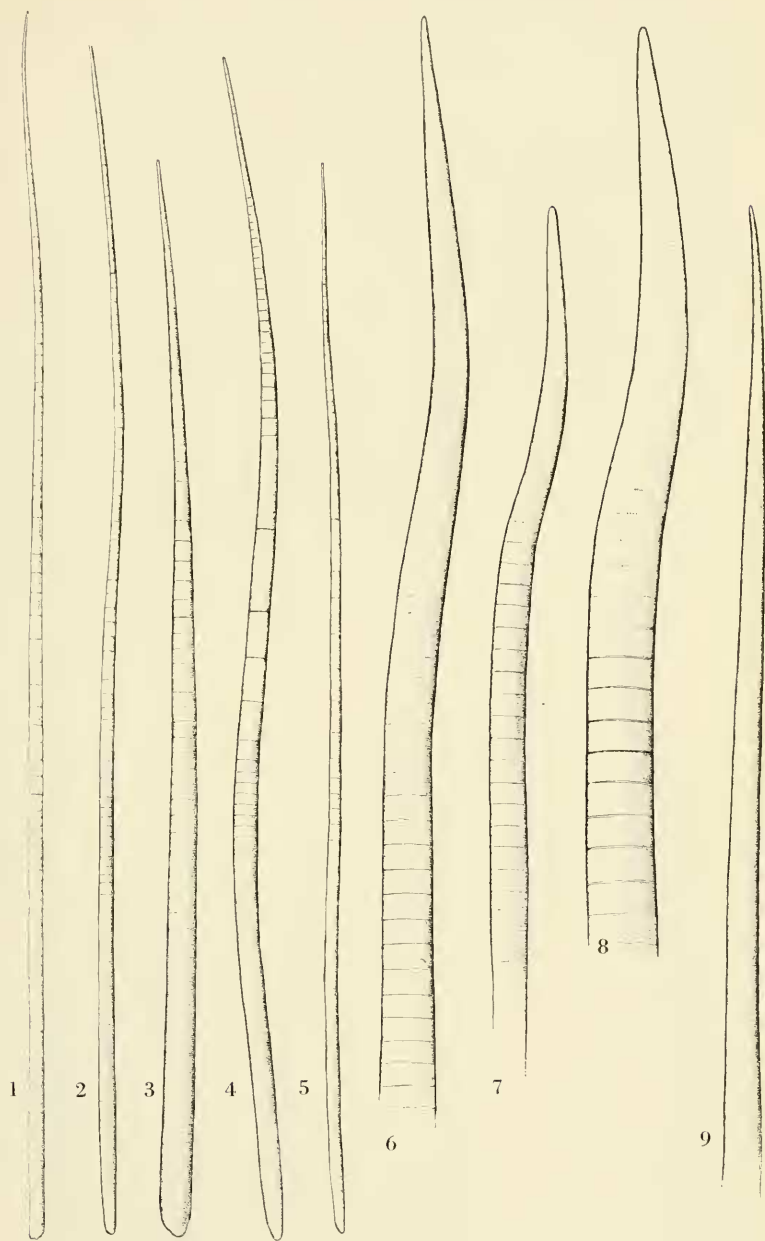
1. Anterior end in left lateral view, x 18.
2. Partly everted oral aperture showing paired palpi, numerous oral tentacles and prostomium with 4 eyes, x 54.
3. Sixth parapodium in anterior view, x 65.
4. First parapodium in posterior view, x 65.



## PLATE 30

*Piromis gracilis* (Stations 216-34 and 930-39)

1. Longer notopodial seta from parapodium 27, x 174.
2. Shorter notopodial seta from parapodium 27, x 174.
3. Embedded neuroaciculum from parapodium 27, x 490.
4. Slightly curved neuropodial seta from parapodium 27, x 174.
5. Notopodial seta from parapodium 100, x 174.
6. Neuropodial falcigerous seta from parapodium 78, x 480.
7. Slenderer neuropodial falcigerous seta from parapodium 100, x 660.
8. Thicker neuropodial falcigerous seta from segment 100, x 660.
9. Companion seta from parapodium 100, x 660.



## PLATE 31

Lower left: *Pherusa capulata* (Moore) (Sta. 5103), showing entire individual in left, lateral view, x 1.

Upper: *Pista disjuncta* Moore (Sta. 5331), showing two nearly complete individuals and part of a thick-walled mud tube, x 1.

Lower right: *Pectinaria californiensis* Hartman (Sta. 5046), showing tube and individual partly protruded from anterior end, x 1.



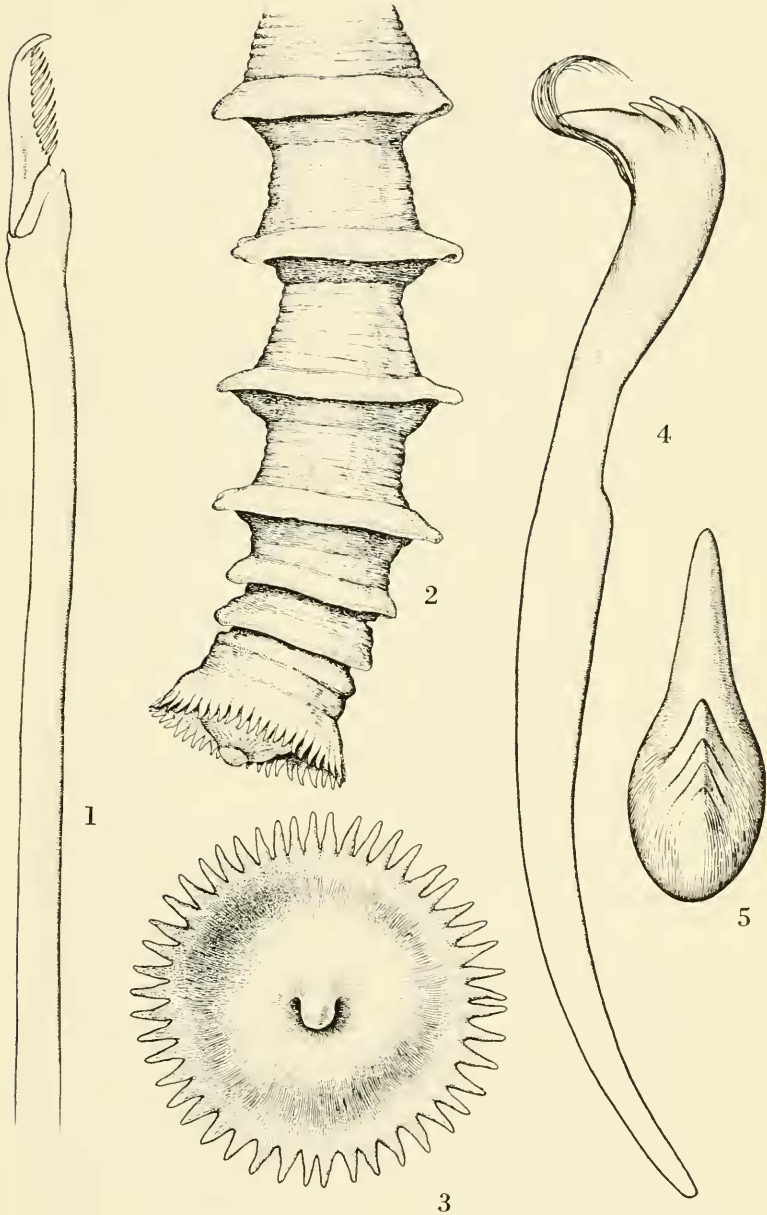
## PLATE 32

*Asychis lacera* (Moore) (Sta. 2130), showing specimen removed from thick, mud-walled tube, and two fragments of the tube, x 1.35.



## PLATE 33

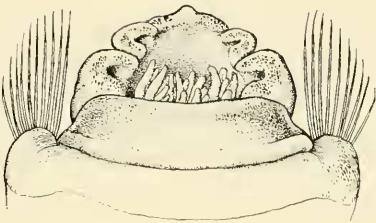
1. *Plakosyllis americana*, new species (Sta. 5768). Neuropodial falcigerous seta, x 10,000
- 2-5. EUCLYMENINAE (Sta. 5538):
  2. Posterior end showing caudal plaque and 6 anteanal asetigerous segments, x 8.
  3. Caudal plaque seen from the end, x 14.
  4. Rostrate neuropodial seta, in lateral view, x 1400.
  5. Rostrate seta seen from the distal free end to show series of rows of teeth, x 2980.



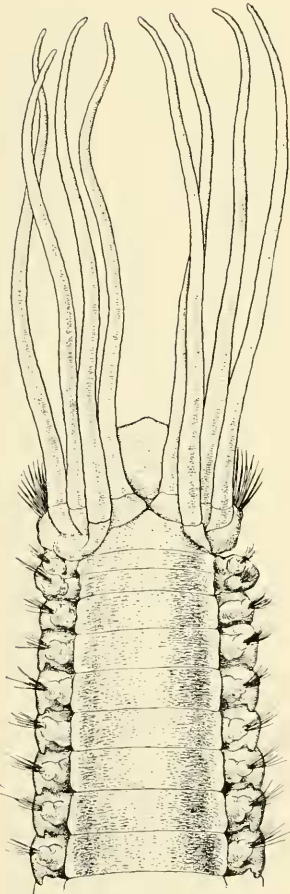
## PLATE 34

*Ampharete labrops*, new species (Sta. 6694)

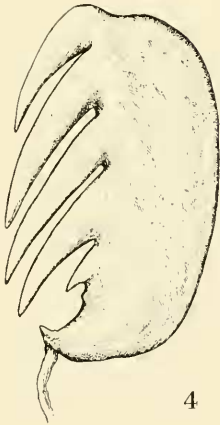
1. Anterior end in dorsal view, with paleal segment and first 9 setigerous segments, x 24.
2. Anterior end in ventral view, showing oculated rim of upper lip and partly extruded oral tentacles, x 36.
3. Palea seen from the side, x 540.
4. Thoracic uncinus in lateral view, x 4000.



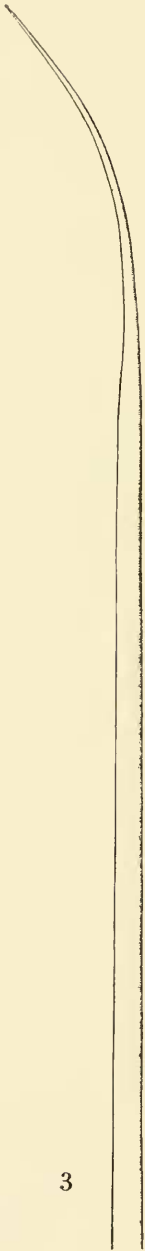
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